

H O R N S B Y S H I R E



RURAL LANDS STUDY



FOREWORD

The rural area of Hornsby Shire has a population of nearly 10,000 and an area of 306km², including Marramarra National Park. The character of the area as a tranquil country district belies its location on the fringe of the Sydney Metropolitan Area and has not altered greatly over the past couple of decades. This is despite considerable economic and social changes at the national, state and regional levels. In addition, the environmental significance of much of the area as part of the Hawkesbury-Nepean Basin has come to prominence with greater recognition of the fragility of the waterways and an emphasis on ecologically sustainable development.

Surrounded by vast tracts of bushland and with the Hawkesbury-Nepean River at its northern boundary, the natural features of the study area are major attractions and contribute to its spectacular physical setting. It is vital that these natural assets are protected from the impacts of unsustainable and inappropriate development so that they can be preserved for the benefit of future generations.

Historically, the Shire's rural lands have been a significant supplier of produce to the population of Sydney. Today, the rural area of the Shire still fulfills this role, although agricultural activities have to compete with a variety of other land uses, including rural-residential development and hobby farms, tourism, commercial and industrial uses. These activities have the potential to further erode the viability of the Shire as a significant rural producing area which could compromise the historical character of the area. Consequently, it is necessary to balance the demands of these competing interests to maintain the character of the area.

The population profile in the study area is continually evolving, placing cyclic demands on the provision of infrastructure, transport, community facilities and recreation facilities. As a result, it is necessary to provide services efficiently and effectively in response to the changing needs of the community.

These issues have prompted this study which has a 20 year planning horizon and will take the rural areas of the Shire into the next century. In this context, this report seeks to review the planning controls for the rural lands and provide a planning direction that is dynamic and responsive to the challenges of an uncertain future. Through such a strategy these competing issues can be managed and community needs and aspirations fulfilled. The study, while prepared by Council, is the community's plan and the community's input is paramount to properly guide the future of the area.

The study is divided into two parts; being Part 1 - "The Planning Report" and Part 2 - "The Planning Strategy". The Planning Report reviews all aspects of the study area and provides principles and findings and the Planning Strategy provides the appropriate recommendations. The Planning Strategy also contains two working documents, namely, "The Draft Local Environmental Plan" and "The Draft Development Control Plan".

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

PART 1 - PLANNING REPORT

Study Page No.

CHAPTER ONE - INTRODUCTION

1.1	Purpose	1
1.2	Study area	1
1.3	Study objectives	2
1.4	Study structure	2
1.5	Acknowledgements	2

CHAPTER TWO - PLANNING FRAMEWORK

2.1	Review of historical planning controls	3
2.2	Current planning controls	6
2.3	Conclusion	14

CHAPTER THREE - HERITAGE RESOURCES

3.1	Historical overview	15
3.2	Historical overview of villages and townships	19
3.3	Heritage management	22
3.4	Conclusion	24

CHAPTER FOUR - NATURAL ENVIRONMENT

4.1	Geology	26
4.2	Topography	28
4.3	Drainage	29
4.4	Water quality	32
4.5	Soil landscapes	39
4.6	Flora	43
4.7	Fauna	48
4.8	Bush fire hazard	49
4.9	Air quality	50
4.10	Climatic change	51
4.11	Conclusion	52

CHAPTER FIVE - BUILT ENVIRONMENT

5.1	Rural areas	54
5.2	Village areas	61
5.3	Conclusion	68

CHAPTER SIX - ECONOMIC ENVIRONMENT

6.1	Employment	69
6.2	Agricultural production	72
6.3	Aquaculture	77
6.4	Business Centres	78
6.5	Rural industries	85
6.6	Tourism	85
6.7	Conclusion	92

CHAPTER SEVEN - INFRASTRUCTURE

7.1	Electricity services	94
7.2	Communication services	96
7.3	Gas services	97
7.4	Water supply	97
7.5	Waste management	99
7.6	Wastewater disposal	100
7.7	Drainage	104
7.8	Conclusion	105

CHAPTER EIGHT - TRANSPORT SERVICES

8.1	Regional transport issues	107
8.2	Public transport	107
8.3	Private transport	108
8.4	Traffic management	110
8.5	Conclusion	113

CHAPTER NINE - VISUAL ENVIRONMENT

9.1	Methodology	115
9.2	Overall physical and cultural qualities	118
9.3	Viewers' experience of the area	119
9.4	Areas of scenic significance	123
9.5	Conclusion	126

CHAPTER TEN - COMMUNITY ISSUES AND SERVICES

10.1	Community profile	128
10.2	Community services	133
10.3	Community preferences	138
10.4	Community needs	139
10.5	Conclusion	139

CHAPTER ELEVEN - RECREATION RESOURCES

11.1	Supply of open space	140
11.2	Identification of needs	141
11.3	Future open space requirements	145
11.4	Conclusion	146

CHAPTER TWELVE - SITE SPECIFIC AREAS

12.1	South Dural	147
12.2	Fiddletown - Arcadia - Berrilee	155
12.3	Mid Dural - Galston Roads	161

PART 2 - PLANNING STRATEGY **Strategy Page No.**

STRATEGY	1
Objective One	
Investigate the role of the Rural Lands within the catchment	2
Objective Two	
Identify the natural and built resources	4
Objective Three	
Investigate the role of agriculture and other rural pursuits	13
Objective Four	
Direction for population, housing and commercial activities	18
Objective Five	
Identify and respond to the needs of the community	23
Objective Six	
Review and update the existing planning controls	28
Objective Seven	
Provide controls for development that improve the environment	37

DRAFT LOCAL ENVIRONMENTAL PLAN

LEP EXPLANATORY NOTES

DRAFT DEVELOPMENT CONTROL PLAN

DRAFT FINANCIAL PLAN

REFERENCES

APPENDICES

LIST OF FIGURES

Planning report

- 1.1 Regional setting
- 1.2 Study area

- 2.1 Zoning
- 2.2 Development Control Plans

- 3.1 Historical Development - to 1880
- 3.2 Historical Development - 1880 to present

- 4.1 Geology
- 4.2 Slopes
- 4.3 Drainage catchments
- 4.4 Soil landscapes
- 4.5 Agricultural land classification
- 4.6 Bushfires

- 5.1 Land use
- 5.2 Lot size distribution - rural lands
- 5.3 Lot size distribution - village areas
- 5.4 Support existing subdivision standard
- 5.5 Desired minimum allotments
- 5.6 Dural Village - lot size distribution
- 5.7 Subdivision development of Galston
- 5.8 Galston Village - lot size distribution
- 5.9 Glenorie Village - lot size distribution
- 5.10 Wisemans Ferry Village - lot size distribution

- 6.1 Income generated from property
- 6.2 Occupation undertaken on property
- 6.3 Proportion of property used to generate income
- 6.4 Commercial centres

- 7.1 Infrastructure
- 7.2 Household water usage

- 8.1 Bus services
- 8.2 Mode of travel to work
- 8.3 Road hierarchy and AADT

- 9.1 Viewers experience
- 9.2 Visual character types

- 10.1 Age distribution
- 10.2 Population growth
- 10.3 Age structure comparison

- 11.1 Open space
- 11.2 Preferred recreational setting

- 12.1 Site specific areas

Planning strategy

- 2.1 Fire protection zone for subdivision

LIST OF TABLES

- 2.1 Summary of commercial centres
- 4.1 Water quality summary
- 4.2 Phosphorous and nitrogen generation rates
- 4.3 Summary of soil landscapes
- 4.4 Agricultural land classification
- 4.5 Flora communities
- 5.1 Summary of land use
- 5.2 Subdivision approvals 1989-1995
- 5.3 Village areas
- 6.1 Farmland returns - landuse
- 6.2 Value of agricultural production
- 6.3 Fish catch
- 6.4 Retail and commercial floor space
- 6.5 Vacant retail and commercial floorspace
- 6.6 Retail expenditure summary per household
- 6.7 Proportion of household expenditure undertaken in local shopping centres
- 6.8 Summary of business activities
- 6.9 Tourist accommodation
- 6.10 Visitors to Hornsby Shire
- 7.1 Alternative energy sources
- 7.2 Method of waste disposal
- 7.3 Effluent disposal method
- 8.1 Bus services
- 10.1 Population distribution
- 10.2 Population characteristics - selected age groups
- 11.1 Existing open space
- 11.2 Provision of local open space
- 11.3 Provision of district open space
- 11.4 Provision of regional open space
- 12.1 Summary of Soil Landscapes
- 12.2 Fauna Corridors - Arcadia Area
- 12.3 Summary of Soil Landscapes - Mid Dural and Galston Roads

APPENDICES

- A Residents' survey
- B Summary of State Planning Policies and Ministerial Directions
- C SREP No.20 - Schedule 4
- D Heritage items
- E Rare and threatened flora species
- F Wetland Review
- G Agricultural production in Hornsby Shire - 1992-93 ABS data
- H Agricultural production survey
- I Commercial centres - land use survey
- J Viewers experience and landscape character types
- K Subdivision options
- L Proposed land use tables - Rural zones

HORNSBY SHIRE RURAL LANDS STUDY

EXECUTIVE SUMMARY

The Hornsby Shire Rural Lands Study reviews the planning provisions which apply to the rural areas of Hornsby Shire and provides a policy framework to guide the future growth of the area. The study area covers some 306 km² or 60% of Hornsby Shire and includes the towns, villages and localities of Glenhaven, Dural, Middle Dural, Galston, Arcadia, Glenorie, Fiddletown, Berrilee, Forest Glen, Canoelands, Maroota, Wisemans Ferry and Laughtondale.

The study is divided into two main parts, being Part 1 - "The Planning Report" and Part 2 - "The Planning Strategy". The Planning Report contains twelve chapters which provide an overview of the issues that are relevant for the study area. The Planning Strategy provides recommended planning strategies for the study area based on the study objectives and contains two mechanisms to implement those strategies, namely, a Draft Local Environmental Plan and a Draft Development Control Plan.

The study aims to address these issues and formulate a policy framework to guide planning decisions for the study area within a planning horizon of 20 years. In this context, the report seeks to review the planning controls for the Shire's rural lands and provide a planning direction that is dynamic and responsive to the challenges of an uncertain future. Through such a strategy, the competing issues can be managed and a clear land use planning direction provided for the area.

The progress of the study has been monitored and directed by the Rural Lands Study Steering Committee. Consultation with the community occurred through public meetings and through the Rural Lands Study Sub-Committee. The Sub-Committee has produced a document entitled "Philosophy, aims and goals - report to the Rural Lands Study Steering Committee" which is referenced in the study. A resident survey was also distributed to obtain community attitudes.

The study adopts the following objectives:

- * to investigate the role of rural lands within the catchment of the Hawkesbury River;
- * to identify the natural and built resources which warrant protection and enhance the environment;

- * to investigate the role of agriculture and other rural pursuits;
- * to provide direction for population growth, housing opportunities and commercial activities;
- * to identify and respond to the needs of the community;
- * to review and update the existing planning controls applying to the rural lands; and
- * to provide controls for development that improve the environment.

This executive summary details the findings of the "Planning Report" and "Planning Strategy" under each of these objectives. The executive summary draws on relevant information in both parts of the study.

Objective One: Investigate the role of rural lands within the catchment of the Hawkesbury River.

In recent years there has been extensive community concern about the poor condition of the Hawkesbury River and the subsequent impact on river uses. In recognition of these concerns to protect the many essential functions of the river, it is appropriate that a Total Catchment Management (TCM) approach to planning within the catchment of the Hawkesbury Nepean River be implemented.

Pivotal to TCM is the interrelated strategy of Ecologically Sustainable Development (ESD). ESD principles recommend that land use decisions be made with a view of long term environmental sustainability with emphasis given to avoiding environmental degradation in accordance with the "precautionary principle". Accordingly, where any proposal will have an adverse impact or the impact cannot be scientifically and/or satisfactorily resolved, the proposal should not proceed.

The planning strategy provides for the incorporation of TCM and ESD principles into a Local Environmental Plan (LEP) and Development Control Plan (DCP) for the study area.

Objective Two: Identify the natural and built resources which warrant protection and enhance the environment.

The Planning Study gave consideration to the protection and enhancement of natural and built resources within the rural lands. These qualities, particularly those associated with the natural environment were recognised as key elements in promoting ESD.

Natural Environment

The natural environment is a dominant feature of the study area and is well preserved through the reservation of National Parks, bushland reserves and other undisturbed areas. The natural environment provides both opportunities and constraints for future development within the study area. Factors which constrain or restrict development in the study area include steep slopes, areas of poor land capability, sensitive and endangered flora and fauna, decreasing water quality of the Hawkesbury/Nepean River, bush fire hazard, air quality and climatic change. Means to protect the features of the natural environment within the study area are recommended, including the rezoning of environmentally sensitive areas to preclude inappropriate development in conjunction with development controls and guidelines for development in other areas.

The strategy recommends:

- * protecting the regionally significant geological resource at Maroota from fragmentation and incompatible land uses. Upon gazettal of amendments to regional legislation the existing Draft DCP that applies to Extractive Industries at Maroota should be updated;
- * to protect sensitive areas from development and to better reflect land capability (including steep slopes, soils, flora and fauna), the boundary of the Environmental Protection B (River Catchment) zone should be amended;
- * lands zoned Residential A (Low Density) at Gentlemans Halt and Singleton Road, Wisemans Ferry should be zoned Environmental Protection B (River Catchment);
- * the extent and nature of flooding downstream of Wisemans Ferry is currently being reviewed as part of the Public Works

Department's Hawkesbury Floodplain Management Study. Upon completion of the Study, the controls applying to the flood liable land should be reviewed;

- * the study area contains extensive areas of bushland which should be protected. The results and recommendations of the Fauna Corridors and Vegetation Links Study should be incorporated into the Draft LEP and Draft DCP;
- * the boundary of the Environmental Protection A (Wetland) zone should be amended to better reflect the location of regionally and locally significant wetlands;
- * land within the study area is subject to a high bush fire threat, especially properties adjacent to bushland. Appropriate measures to control development should be incorporated into the Draft LEP and Draft DCP.

Visual Environment

The rural lands of Hornsby Shire have a range of visual qualities and characteristics ranging from the more modest to among the most spectacular in the State. The landscapes of the study area are changing under the influence of natural processes, land use and pressure for settlement pattern change. These changes have the potential to alter the visual quality of the area in the future. To conserve the desirable values of the rural lands, the study identifies the qualities which give the area its scenic and rural character. This provides a framework to determine the effect of natural and planned changes and evaluate whether scenic qualities can be preserved.

The overall landscape qualities of the area and the views, vistas and panoramas of the main road and river corridors are identified and a strategy formulated to preserve and enhance the scenic qualities in the study area through the introduction of development controls.

The strategy recommends:

- * the adoption of nine landscape character types. Of these types, 3 are considered to have State significance, 1 regional significance and 5 local significance;
- * the adoption of controls to preserve the character of each of the landscape character types should be incorporated into the Draft DCP;

- * controls to maintain and enhance views and vistas from major roads and water corridors should be incorporated into the Draft DCP;
- * development consent should be required for large rural and agricultural structures to enable their potential visual impacts to be assessed.

Heritage Resources

The heritage of the study area contributes to the visual environment and the rural character of the area. Evidence of Aboriginal occupation is present throughout the study area with the most known examples being situated in the northern areas near Maroota, Canoelands and in Marramarra National Park. European heritage is also a feature and contributes strongly to the rural character of the area.

The rural history of the area is under threat from development pressures and mechanisms to reduce the threat of demolition and promote the retention of heritage resources in the area are recommended, including incentives for properties containing heritage items. In addition the need to provide for the conservation of heritage items has been identified in accordance with the contribution they make to the rural character of the study area.

The strategy recommends:

- * the protection of aboriginal sites. The appropriate management of sites is being considered as part of Council's Aboriginal Heritage Study, which is due for completion in early 1996;
- * the consideration of nine items of potential European heritage significance which should be reviewed as part of the current Heritage Review Study;
- * to assist the conservation of heritage items within the rural areas, the heritage provisions of the HSLEP should be amended to permit a second detached dwelling and/or flexible land uses on properties containing a heritage listed dwelling.

Objective Three: To investigate the role of agriculture and other pursuits.

Agricultural production contributes an estimated \$98 million per annum to the economy of the

study area and contributes to local employment. The main contributors to the value of production are wholesale nurseries, cut-flowers, stone and citrus fruit and vegetables. Agricultural production is an important element in the visual appearance and character of the area, which in turn is an attraction to visitors. Agriculture also acts as a buffer for the urban expansion of the Sydney region.

In recognition of the benefits of agriculture and to minimise the pressures on agricultural use the strategy recommends that controls be implemented to address the implications of changes in the land use patterns. The report recommends that existing or potentially productive agricultural lands should be protected from development that could erode or fragment agricultural viability. Controls should also be implemented that address the implications of changes in the land use patterns and which recognise the principles of sustainable agriculture.

The role of land use management controls in sustainable agriculture, is one of preserving areas suitable for agricultural production and encouraging agricultural production in those areas through appropriate planning controls. This role can be fulfilled through controls which retain agriculturally productive lands and not to sterilise areas through incompatible development, fragmentation of viable agricultural land, inappropriate subdivision standards and other planning controls.

The strategy recommends:

- * the maintenance of agricultural activities within the study area has the potential for long term protection of the water quality of the Hawkesbury River and its tributaries;
- * the protection of productive or potentially productive agricultural lands;
- * the definition of agriculture should be replaced with a definition that includes extensive agricultural production (grazing, orcharding). A separate definition for intensive agriculture should be introduced, covering intensive horticulture, intensive livestock keeping and agriculture which involves the clearing of bushland;
- * the definition of animal establishments should be clarified to provide a better distinction with agriculture and renamed animal boarding or training establishments;

- * the adoption of the principles of sustainable agriculture;
- * large agricultural structures should require consent because of their potential visual impact on the environment.

Objective Four: To provide direction for population growth, housing opportunities and commercial activities.

One of the objectives of the Environmental Planning and Assessment Act, 1979, is "the promotion of the orderly and economic use and development of land". To achieve orderly development requires satisfying not only the environmental qualities of the area, but also the efficient and effective use of land to meet the needs of the local and broader population. Accordingly, the strategy, provides direction for population growth, housing opportunities, business centres, tourism and industrial activities.

Population growth

The population profile of the study area indicates a "mature" population consisting of a majority of established families, with young adults and some households of young working adults. It is likely that a very gradual population growth will continue without variation to existing planning controls.

Constraints to development in the area include ESD principles, areas of poor land capability and flora and fauna habitats that should be preserved to maintain communities, fauna movement and biodiversity.

Further constraints to development within the area include infrastructure and the transport network including the limited supply of town water and the need for appropriate means of effluent disposal. Population increases would also place additional demands on community and recreation facilities and local and regional transport networks which are constrained by limited access to and from the study area.

The demand for rural residential and urban encroachment should be resisted where inadequate or insufficient infrastructure is apparent and where natural environments and existing or potentially productive agricultural land may be prejudiced.

The Department of Planning's publication "Cities into the 21st Century" provides a policy framework for determining the implications of population growth within the Sydney Region and within Hornsby Shire. While the Cities for the 21st Century strategy does not explicitly indicate population growth distributions, there is an emphasis on the "compact city" strategy, combined with a recognition of the benefits of preserving agricultural potential and recognising the environmental limitations of fringe areas. Accordingly, any necessary population growth within the Hornsby Shire would most appropriately be accommodated within the existing urban areas or areas immediately adjoining existing urban areas.

There are limited opportunities for additional population growth in the rural lands and a policy of constrained population growth is appropriate for the study area. Where population profiles indicate a demand for additional housing, a preferable strategy would concentrate additional persons within and adjacent to the existing villages which are discrete, can be better serviced and the impacts associated with development can be appropriately managed.

The strategy recommends future population growth should not occur in areas of poor land capability or good agricultural production, poor service provision or where it may impact upon water quality.

Housing opportunities

The population profiles demonstrate a short and long term need for housing suited to the older age categories which are likely to increase as a proportion of the population. There is also a more immediate need for appropriate and affordable housing for the young adult age group who comprise a disproportionately high percentage of the population and are likely to be seeking their own accommodation over the next few years.

These two age groups have similar housing needs and opportunities for different styles of housing within or adjacent to the Village areas should be pursued to encourage and promote a wider choice of housing types. The Galston Village is the most capable of supporting additional residential development through a northwards extension of the Residential zoning to School Road. This extension would permit further accommodation and therefore opportunity for additional housing for the aged and young adults. The extension has

the benefit of being within the same catchment as the existing village, allowing water quality impacts to be concentrated and appropriately managed.

The strategy recommends:

- * that there is a short and long term need for housing suited to the older age categories. There is also a more immediate need for appropriate and affordable housing for the young adult age group, who comprise a disproportionately high percentage of the population;
- * the village areas are the most appropriate locations for population growth.
- * the northward extension of residential zonings in Galston Village to School Road.

Commercial Activities

The retail environment within the study area is part of a broader network of business activities and is influenced by the wider commercial environment. Limited population growth within the area will restrict the potential expansion of retail and commercial centres within the study area, although some expansion could be accommodated based on an increase in retail expenditure capture rates.

The proposed expansion of Galston Commercial Centre would increase existing floorspace, however the constraints posed by location and limited population growth would retain the centre's role as a local one. Galston Commercial Centre lacks integration and it is recommended that a masterplan be prepared for the centre to improve vehicle access and design among other issues. Other centres are expected to continue their role and function in the current hierarchy of business centres throughout the study area and retain their current trading patterns.

Tourism is one of Australia's fastest growing and economically important industries. Although there are no figures relating to the study area specifically, it is estimated that the Shire attracts over one million visitors per year, contributing approximately \$29 million to the local economy. Tourism can contribute to the local economy through expenditure by visitors and the subsequent multiplier effect which ultimately affects all sectors of the community. The attractions within the study area which draw tourists are a combination of both natural and

man made resources which together create a distinct rural character.

The study area could better realise its tourist potential through increasing its exposure, presentation and access to facilities. Improved signs, avenue tree planting along main thoroughfares, upgrading of the business centres and improved facilities for bushwalkers and picnickers would improve the tourist potential of the area.

Overnight visitors spend over double the amount the day trippers are inclined to spend. Accordingly, it would be beneficial to the local economy to increase the amount of overnight accommodation within the study area. The provision of such accommodation would have to be balanced against the possible negative social and environmental impacts of tourism through establishing relevant controls and assessment criteria. It is recommended that provision should be made for bed and breakfast accommodation, farmstay accommodation and ecotourism facilities. Controls are also recommended to ensure that the potential social and environmental impacts of tourist facilities are mitigated.

Rural and home industries provide a source of employment within the rural area and can currently be undertaken in all rural zoned land. Rural industries are those industries associated with primary products derived from the local area. Home industries are those activities undertaken within a 50m² building on rural properties. Whilst the economic value of these activities cannot be easily determined, it is acknowledged that they provide both a source of employment along with a contribution to the local economy.

The size of rural properties can allow small businesses to be concealed from adjoining neighbours and to not effect the amenity of the area. Many of the businesses which initially commence as small operations have grown to the extent that they have potential to affect the natural environment and business centre hierarchy. It is recommended that an upper limit be set for these activities which recognises the employment and economic benefits, although avoids the associated impacts on the environment, business hierarchy and infrastructure.

The strategy recommends:

- * that the limited population growth in the area will restrict the potential expansion of the retail and commercial centres.
- * Galston Commercial Centre lacks integration and should be rationalised to provide a more appropriate and attractive shopping area. A masterplan has been prepared for the Centre, proposing the rationalisation of car parking and access points, the development of a village green, and development opportunities for new and/or relocated retail and commercial facilities;
- * there is a need to provide more low scale overnight tourist accommodation, including bed and breakfasts, farmstay, and guesthouse accommodation. These uses should be incorporated into the Draft LEP;
- * ecotourism facilities, which promote the ecological values of the bushland, waterways and rural areas should be permitted in the Rural and Environmental Protection zones;
- * that there is not a need for industrial zoned land within the study area;
- * The controls for home industries should be amended to increase the maximum floor area from 50m² to 200m² and to allow a maximum of 3 employees.

Infrastructure

The report reviews the extent and adequacy of infrastructure to supply the existing and future needs of the rural and village communities. Future service provision will be formulated in close liaison with the main service providers of electricity, communications, water supply, waste disposal and sewage and drainage services.

A reticulated water supply service is available to the majority of properties south of Glenorie and opportunities for extension are limited due to the relative elevation of the reservoirs and the extent of area to be serviced. The report recommends the implementation of water conservation strategies to reduce runoff and demand on Sydney's water supply network.

The disposal of effluent and waste water has been identified as a source of pollution in the waterways. The provision of sewer facilities to the area is currently not commercially viable and

without the provision of a reticulated sewerage system, the development potential of the study area is limited.

Objective Five: To identify and respond to the needs of the community.

One of the objects of the Environmental Planning and Assessment Act, 1979 is "to encourage the provision and co-ordination of community services and facilities."

Community facilities

Community issues and services are influenced by community profiles, social support facilities and community preferences. In general, the rural area is well served by community facilities, however some deficiencies exist. As the population ages, there will be an increased demand for retirement style housing such as villas and retirement homes. A need for additional local medical facilities has been identified which can be met by private sector services where demand warrants.

Halls and Meeting Rooms: The report identified the need for additional facilities within Galston and Canoelands. A regional sized community centre with a seating capacity of 500 people has been proposed for Galston. This facility would need to be located in close proximity to the Village area to avoid isolating less mobile groups of the community. Consideration could be given to the expansion of the existing hall. The existing building is a heritage item and any extension would need to be compatible with its heritage significance. This could be achieved by extending the building to the south or west where the impact would be minimised.

The establishment of a regional size community centre at Galston would have the capacity to serve the catchment of the study area and peripheral areas in Baulkham Hills. However, it was noted that a regional community centre in Galston would not adequately service the needs of small, isolated communities in the study area.

The Canoelands district is the most populous and isolated area within the study area without a local meeting hall. Accordingly, it is recommended that consideration be given to a small community meeting hall in the Canoelands area with a minimum capacity for 30 seated persons.

Library facilities: The report identified a current shortfall in library floorspace in the study

area and recommended a review of the role and function of Galston library following the relocation of Pennant Hills and Castle Hill Libraries.

Youth Facilities: A shortage of social/meeting facilities including youth centres, low cost restaurants and coffee shop/cafes to cater for teenagers exists in the study area. The shortage of youth facilities is particularly apparent in the study area which has the highest proportion of persons in the 0-19 years age group throughout the Shire.

Galston is central to the other southern districts and would be the most suitable location for additional youth facilities and services. Facilities that can serve youth groups include recreation and leisure oriented facilities. In Galston, the only facility that currently fulfils this role is the aquatic centre at Galston Park which is located opposite Galston High School. The advantages provided by the location of this facility makes it an ideal location for the provision of additional facilities to serve younger age groups.

The provision of facilities for teenagers in the northern districts of the study area are limited due to the lower numbers of persons aged 0-19 years and the wide population distribution. Consequently, community based recreation facilities will continue to provide the most viable option to meet the existing and future social needs of teenagers in these areas.

The strategy recommends that:

- * additional community hall facilities be provided in Galston, the preferred option being the sympathetic expansion of the existing hall;
- * a small meeting hall/room should be provided at Canoelands, possibly adjacent to the Bush Fire Brigade Station;
- * a review of the role and function of Galston Library should occur following the relocation of Pennant Hills and Castle Hill Libraries;
- * there is a need for additional housing for the aged and associated services;
- * facilities for youth should be provided at the Galston Commercial Centre and at the Galston Aquatic Centre.

Recreation Resources

Recreation resources within a community are important to the community's physical, social and emotional well-being. Generally, the study area is well served by recreation facilities with more than 50% of respondents to the residents' survey, indicating that each of the different types of recreational facilities were adequate in their area.

The planning report provides an inventory of recreation resources for the population thresholds these facilities should support. There is a deficiency in local open space areas and facilities in the Galston, Dural and Wisemans Ferry Village areas and the planning strategies for these areas include measures to provide these facilities.

District open space includes picnic facilities, sports fields and tennis/netball courts which serve the wider community rather than just the immediate area. An evaluation of supply in relation to the total population of the study area identified a need for an additional four tennis courts and two netball/basketball courts within the rural areas. It is recommended that these facilities be provided in districts with the greatest population thresholds.

The study area has an abundant supply of regional open space within the Marramarra National Park, Berowra Valley Bushland Park and the Hawkesbury River.

The strategy recommends:

- * additional neighbourhood parks should be provided at Galston, Dural and Wisemans Ferry;
- * the provision of district open space facilities is generally well above adopted benchmarks. However there is a need to provide an additional 4 tennis courts and 2 netball/basketball courts. It is proposed that these additional facilities be provided within or adjacent the village areas;
- * the study area contains extensive areas of regionally significant bushland and waterways which are used for recreational purposes;
- * additional recreational facilities be constructed at Galston Aquatic Centre.

Transport

The road network within the study area is consistent with traffic management principles and private car based transport will remain the main travel mode in the rural areas of Hornsby and Baulkham Hills. The road hierarchy, combined with relatively low traffic volumes, eliminates the need for a large scale traffic management programme. Traffic within the study area is provided with a high level of service on all types of roads within the study area although this is tempered by constraints in the regional road network. The traffic network will experience greater pressures through increased rural and residential development and from traffic associated with the north west sector.

Public Transport: The existing public transport system in the study area provides limited opportunity for residents to access shopping and employment centres in the rural area and the surrounding region. While the level of patronage by persons in the workforce is low, opportunities exist to improve public transport service links to key transport interchanges in the region.

An integrated approach to transport planning is required to achieve maximum economic benefit and to provide acceptable levels of mobility for all sectors of the community. The study has found that it is unlikely that public transport services within the study area will improve in the near future, on the grounds of limited population growth and low demand for these services.

To augment the existing transport network, the strategy provides opportunities for alternate transportation between village areas, community and recreation facilities through the implementation of pedestrian and bicycle networks. Pedestrian and bicycle routes should follow logical routes that link destinations such as sporting facilities, playgrounds, schools and routes to adjoining areas. A need is identified for a formalised network of off-road cycle paths within the study area to provide links with local schools. Accordingly, it is recommended that a strategy be prepared for the designation of formal bicycle links between the Village areas and community, recreation and social facilities. Similarly, the report identified a need for the implementation of formal horse riding routes in the study area.

Road Network: The planning report noted that car based transport will remain the main travel mode in the rural areas of Hornsby and Baulkham

Hills. The report also noted that expansion of the collector and local road systems is not required in the short term. However, existing transport corridors along Arcadia, Bay and Berrilee Road have been identified for upgrade and better delineation in the medium to long term.

The remaining roads in the study area have the capacity to accommodate greater volumes of traffic, but may require pavement, rehabilitation and improvements to the road geometry.

The strategy recommends that:

- * pedestrian and bicycle routes should be developed following logical routes that link sporting facilities, community facilities, playgrounds, schools and adjoining areas;
- * investigations should be undertaken for the establishment of horse riding trails in consultation with local horse riding clubs and equestrian establishments;
- * traffic control measures to improve traffic flow and pedestrian safety are required in the Dural and Galston Commercial areas.

Objective Six: Review the existing planning controls applying to the rural lands

Planning for the study area is undertaken or directed by all three levels of government. In 1992, the Federal Government introduced the National Strategy for Ecologically Sustainable Development (ESD).

Currently, the dominant strategic planning principle at the State level is that of the compact city. The compact cities policy aims to protect the natural environment, take up less new land, maximise the use of existing infrastructure, provide better transport links and locate housing in proximity to services and employment.

Hornsby Shire Council is vested with the planning responsibility for the area. This process is undertaken within the parameters established by broader State and Federal planning frameworks. The Environmental Planning and Assessment Act, 1979, requires that Council regularly and periodically review the planning provisions within the Shire to ensure consistency with the objectives of the Act. This is to ensure that a clear direction is provided in land use planning in order to facilitate improved short and long term planning decisions.

The planning framework that applies within the study area has been established as a consequence of the changing roles of the three levels of government in relation to the management of land uses. In recognition of these changes and to meet community aspirations, it is necessary to review the existing planning controls at the local level.

Future Planning Control Options

The Study has the option of recommending either the continuation of the existing prescriptive controls or recommending an alternative type of control. In determining what type of controls are appropriate, it is essential that the controls recognise community aspirations.

The adoption of revised allotment sizes smaller than those present would increase opportunities for subdivision which would have resultant increases in population and would be inconsistent with the strategy of population restraint. It can be reasonably concluded that the retention of the existing 10ha and 2ha standards is the most appropriate means of density control to achieve a strategy of population restraint.

The consistency of application of the standards in themselves has created a certain level of community expectation for development within the area, which should also be considered in the context of determining appropriate planning provisions.

Land within the rural area has also been identified as contributing to the rural character and rural values within the area. The visual qualities of these lands are recognised through their nomination as Rural Landscape zones. Accordingly, two zone titles are included in the LEP relating to Agricultural Landscapes and Rural Landscapes zones. These zones are supplemented with relevant objectives consistent with the structured format of objectives for the land use tables within the HSLEP.

Village areas: It is proposed to replace the Residential A (Low Density) zoning that applies to Dural, Galston, Arcadia and Glenorie with a zone titled Residential AR (Low Density - Rural Village). The Rural Villages have a different character and level of servicing when compared with urban areas. Accordingly, a separate zone with different land use provisions should apply. It is proposed that the Residential AR zone retain a minimum allotment size of 500m², however

multi-unit housing should not be permitted. A floor space ratio of 0.4:1 remains appropriate.

Rural areas: The study identified the need to restrain population growth within the rural areas. The most appropriate means of achieving this is the provision of density standards (maximum number of dwellings per hectare or minimum allotment size). Consequently, it is proposed to retain the existing subdivision standards of 2ha and 10ha.

The existing zones do not distinguish between lands of different agricultural capability or landscape character, or recognise regionally significant extraction resources.

- * A specific zoning to reflect the Maroota extractive industry area is also appropriate to reflect the extractive resource and acknowledging the regional significance of extractive resources in the Maroota area. Land use controls for the zone should be designed to restrict the fragmentation of land, non-compatible land uses and other land uses which might sterilise the sand resource.
- * It is proposed to replace the existing Rural A and B zones with the following zones:

Rural AA (Large Holdings - Agricultural Landscapes) zone - 10ha;
Rural AR (Large Holdings - Rural Landscapes) zone - 10ha;
Rural AE (Large Holdings - Extraction) zone - 10ha;
Rural BA (Small Holdings - Agricultural Landscapes) zone - 2ha;
Rural BR (Small Holdings - Rural Landscapes) zone - 2ha;

Site Specific Areas

The study also assessed three site specific areas which were the subject of rezoning submissions, located at South Dural, Fiddletown-Arcadia-Berrilee and land at the intersection of Mid-Dural and Galston Roads, Galston.

South Dural: The South Dural precinct is capable of sustaining rural pursuits and may be capable of urban development. The report recommends that Council adopt a "precautionary" approach to considering the rezoning of the South Dural precinct to enable urban development. When Hornsby West Sewerage Treatment Plant has been upgraded and water monitoring of Berowra Creek has been

undertaken to determine the environmental effectiveness of the upgrade, Council will be better placed to determine whether the rezoning of South Dural should be considered and the effect such upon the water quality of Berowra Creek. Only at this stage is it appropriate that Council undertake a comprehensive strategic assessment of the rezoning the precinct to accommodate additional housing.

The bushland area within the South Dural area adjacent to Georges Creek is incapable of supporting rural or urban activities due to environmental factors of slope, soils, fauna and flora. The cumulative effect of these environmental features reduce the capacity of the land to support any rural or urban activity. The existing zoning in this area is not appropriate and the zoning should be amended to an Environmental Protection B (River Catchment) zone to reflect the sensitive nature of the creek and adjoining land.

Fiddletown-Arcadia-Berrilee: The Fiddletown-Arcadia-Berrilee Area was subject to a proposal to amend the subdivision standard from 10ha to 2ha. The land is generally capable of sustaining rural pursuits, despite portions of the area being significantly constrained by features of the natural environment. Opportunity to reduce minimum allotment sizes in the area and thereby increase population densities is constrained by natural environment and infrastructural factors, including the provision of water and disposal of sewerage. These factors represent the major prohibiting factors for more intensive rural residential development, due to their environmental and economic costs.

It is recommended that until such time as Hornsby Council seeks to encourage rural residential development, and is certain adequate environmentally sound servicing can be provided to the subject area, a "precautionary" approach should be adopted, through the maintenance of the current subdivision controls.

Galston: The Mid-Dural and Galston Roads precinct is subject to a proposal for rural residential, 1 acre subdivision. The assessment of this proposal found that more intense rural residential development within the precinct could not be supported by any planning rationale having regard to State and local strategic planning policies. The evaluation of the natural environmental and servicing capabilities that apply to the site identified physical constraints and opportunities for the land to accommodate a

rural/residential zoning. However, the planning strategy recommends that the provision of alternative housing styles are more appropriately located within the village areas.

Planning Mechanisms

It is proposed to implement the recommendations of the strategy through a Draft LEP and Draft DCP. The contents of the DLEP are as follows:

Draft Local Environmental Plan: The Draft LEP consists of both a written instrument and a map. The written instrument details a number of amendments, namely:

- * the deletion of the land use tables and subdivision standards for the Rural A and B zones and the inclusion of land use tables and subdivision standards for the:

Rural AA (Large Holdings - Agricultural Landscapes) zone - 10ha

Rural AE (Large Holdings - Extraction) zone - 10ha

Rural AR (Large Holdings - Rural Landscapes) zone - 10ha

Rural BA (Small Holdings - Agricultural Landscapes) zone - 2ha

Rural BR (Small Holdings - Rural Landscapes) zone - 2ha

Residential AR (Low Density - Rural Village) zone - 500m²

- * consequential amendments to the land use tables for the Business E (Service Centre), Open Space and Environmental Protection zones as a result of the introduction of new land use definitions;

- * the inclusion of a 0.4:1 floor space ratio for the Residential AR (Low Density - Rural Village) zone;

- * amendment of the Heritage Provisions to permit the erection of a second dwelling on a property containing a heritage building and the flexible use of heritage buildings;

- * the incorporation of the Flora and Fauna Protection clauses, as recommended in the Fauna Corridors and Vegetation Links Study;

- * the inclusion within the Land Use Exception Table of educational establishments and caravan parks;

- * revised definitions for agriculture, animal establishments, home industry, motel and tourist facilities.
- * the inclusion of definitions for intensive agriculture, bed and breakfast accommodation, ecotourism facility, farmstay accommodation, farm management plan, guesthouse accommodation and rural structures.
- * the inclusion of definitions relating to the Flora and Fauna Protection clause.

The proposed zoning map completely revises the zoning of properties within the study area, and details:

- * a rationalisation of Environmental Protection A (Wetlands) and Environmental Protection B (River Catchment) zone boundaries;
- * the zoning of land at Gentlemans Halt and Singleton Road, Wisemans Ferry, Environmental Protection B (River Catchment);
- * rezoning of the village areas at Dural, Galston, Arcadia and Glenorie, Residential AR (Low Density - Rural Village);
- * the extension of the Galston Village to School Road;
- * the rationalisation of the Residential zoning of No.2 Geelans Road, Arcadia;
- * the retention of the existing Business C (Neighbourhood) zoning at Galston and Wisemans Ferry;
- * the zoning of Marramarra National Park and Maroota Historic Site to reflect gazetted boundaries;
- * the location of the proposed rural zones;
- * the retention of the existing open space and special use zonings.

Objective Seven - To provide controls and guidelines for development to improve the environment.

Objective seven identifies matters to be included in the Draft DCP. The Rural Lands (Interim) DCP provides a basic framework for the new DCP and will remain relevant until the final adoption

of the new DCP. The following issues are included:

- * matters identified in the discussion on the previous objectives;
- * strategies and masterplans to guide the future development of Galston, Dural, Glenorie and Wisemans Ferry Villages to be undertaken in consultation with Baulkham Hills Council.

Exhibition and submissions

The Rural Lands Study is on exhibition from 6 March to 28 June, 1996. Copies of the complete documents are available for inspection at the following venues:

Hornsby Council - 1st Floor Development Division Counter (copies available for inspection or purchase)
 Galston Library (copies available for inspection or borrowing)
 Hornsby Central Library (copy available for inspecting or borrowing)
 Glenorie Post Office (copy available for inspection)
 Maroota Public School (copy available for inspection)
 Wisemans Ferry Community Centre (copy available for inspection)

Community meetings/workshops to discuss the documents will be held during the course of the exhibition. The dates, time and venues of the meetings will be advertised in the Hills News and Hornsby Advocate.

As these documents will guide development in the area for the next 20 years, Council encourages and will welcome your comments on the study, draft LEP and draft DCP. Submissions should be posted or delivered to Council by 28 June, 1996. Council will consider all submissions in determining whether to proceed, modify or reject the recommendations of the study and its implementation through the draft LEP and draft DCP.

Due to the complexity of issues contained within the study, it would be appreciated if submissions could address each issue under the headings listed in this paper or the study. Submissions should be sent to:

Hornsby Shire Council
 P. O. Box 37
 HORNSBY 2077
 Attention: Planning Branch

Part 1 - Planning Report

CHAPTER ONE - INTRODUCTION

The rural lands of Hornsby Shire are located between Glenhaven-Dural and Wisemans Ferry some 20 to 50km north west of the Sydney CBD and within the catchment of the Hawkesbury River (Figure 1.1). The area is diverse in character and includes residential villages, productive agricultural lands, commercial centres, extensive bushland and river foreshore lands.

1.1 Purpose

Hornsby Shire Council is vested with the planning responsibility for the area within a broader state and federal framework. The Environmental Planning and Assessment Act, 1979 requires that Council regularly and periodically review the planning provisions within the Shire to ensure consistency with the objectives of the Act.

The planning context of the study area can be seen at a macro and micro level. The macro, or strategic level, provides an overall policy direction for decisions taken at the micro level. It is important in terms of the community's aspirations that a clear direction is given in land use planning to facilitate improved short and long term planning decisions. Community aspirations have and will continue to shape the direction of planning within the area, although it remains Council's role to implement appropriate land use planning and provide the necessary land usedirection.

The purpose of this study is to review the planning provisions which apply to the rural lands and to provide direction for the future evolution of the area. The area is experiencing increased pressure for subdivision, residential development, intensification of agricultural development, industrial development and tourism, as well as pressure to preserve the rural character, bushland, water quality and the visual amenity of the area. The capacity of the infrastructure servicing the area and the environmental capacity of water catchments should be examined to determine the type of development, if any, that can be accommodated within the area.

The study aims to address these issues and formulate a policy framework to guide planning decisions for the study area within a planning horizon of 20 years. In this context, this report seeks to review the planning controls for the Shire's rural lands and provide a planning direction that is dynamic and responsive to the

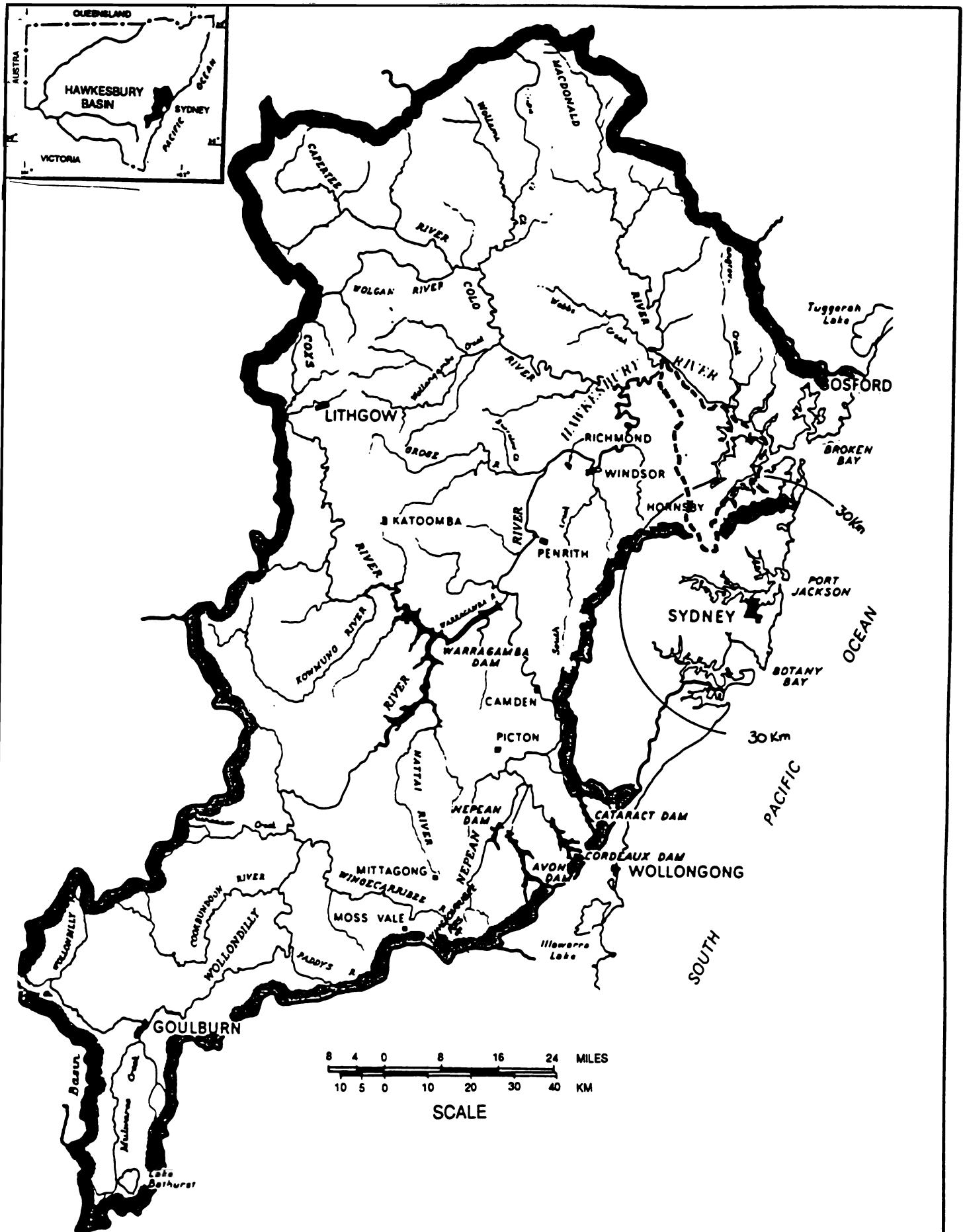
challenges of an uncertain future. In this regard, some elements of the strategy may require review in 5 or 10 years. Through such a strategy, the competing issues can be managed and community needs and aspirations fulfilled.

The study is intended as a planning study and does not provide a detailed analysis of any one issue. Accordingly, while the study will examine environmental, land capability and water quality issues, it will not provide a detailed environmental assessment of the area.

1.2 Study area

The study examines the area between Glenhaven-Dural and Wisemans Ferry, that is generally bounded by Old Northern Road, the Hawkesbury River, Berowra Creek and Georges Creek and covers some 306 km² or 60% of Hornsby Shire (Figure 1.2). The study area includes the towns, villages and localities of Glenhaven, Dural, Middle Dural, Galston, Arcadia, Glenorie, Fiddletown, Berribee, Forest Glen, Canoelands, Maroota, Wisemans Ferry and Laughtondale. Forty three (43) percent or 132 km² of the study area is within the Marramarra National Park which is managed by the National Parks and Wildlife Service. This study will not specifically address the management of this National Park which is addressed in a draft Plan of Management. The study will, however, address issues within the rural area that impact upon the National Park, such as water quality. The study does not address the River Settlements located along Berowra Creek or the urban area of Dural which were considered under the River Settlements Planning Study (1993) and the Cherrybrook Precinct Plan (1992), respectively.

The western boundary of the study area is Old Northern and Old Telegraph Roads which forms the local government boundary between Hornsby and Baulkham Hills Council. Old Northern Road also follows the ridgeline that separates the catchments of Berowra Creek and Cattai Creek. Whilst the boundary separates drainage catchments, it is not a boundary associated with social and economic issues. For example, residents of both local government areas rely on sporting, community and shopping facilities provided in both Council areas. Similarly, Wisemans Ferry is located on the boundary between Hornsby, Baulkham Hills, Gosford City and Hawkesbury City local government areas and is influenced by each area. Consequently, relevant sections of this study will, by necessity,



— — — Hornsby Shire

REGIONAL SETTING

Figure 1.1



consider the population and resources within the adjacent local government areas.

1.3 Study objectives

The study has the following objectives:

- * to investigate the role of rural lands within the catchment of the Hawkesbury River;
- * to identify the natural and built resources which warrant protection and enhance the environment;
- * to investigate the role of agriculture and other rural pursuits;
- * to provide direction for population growth, housing opportunities and commercial activities;
- * to identify and respond to the needs of the community;
- * to review and update the existing planning controls applying to the rural lands; and
- * to provide controls for development that improve the environment.

1.4 Study structure

The study is divided into two main parts, being Part 1 - "The Planning Report" and Part 2 - "The Planning Strategy". The Planning Report provides an overview of the issues that are relevant for the entire study area. The chapters include planning framework, heritage, natural environment, built environment, economic environment, infrastructure, transport, visual environment, recreation and community issues. A number of issues are then considered in more detail which relate to site specific locations. The Planning Strategy provides recommended planning strategies for the study area and contains two mechanisms to implement those strategies, namely a Draft Local Environmental Plan and a Draft Development Control Plan.

1.5 Acknowledgements

The preparation of this study was assisted by a number of government authorities, industry groups, community groups and other individuals. To oversee the preparation of the study, Hornsby Council established a Steering Committee and a Sub-Committee. The Steering Committee comprised representatives of Council, NSW Agriculture, Environment Protection Authority, Department of Urban Affairs and Planning and the National Parks and Wildlife Service. The Sub-Committee comprised representatives from community and industry groups and other

interested residents. The assistance of these persons and organisations is greatly appreciated.

The Sub-Committee prepared a report, titled "Philosophy - aims and goals", which provides a source to identify community aspirations. The report considered 15 issues and contained an aim for each issue and individual comments by the Sub-Committee members. Community aspirations were also assessed through the analysis of a residents' survey (Appendix A) which was distributed as part of the study. A total of 1074 surveys were completed and returned, representing a response rate of 43%. The results of the survey have been incorporated into the study. The assistance of residents who completed the survey is also acknowledged.

The following persons and organisations are also acknowledged for their assistance with various sections of the study:

Hirst Consulting Services - Retail Analysis
Lambcon Associates - Scenic Quality Assessment
NSW Agriculture - Agricultural Production Survey
Whitelaw and Crystal Architects - Galston Village Masterplan
Mrs J. Howell - 1788 Vegetation Report
P. & J. Smith - Review of Wetland Areas.

CHAPTER TWO - PLANNING FRAMEWORK

A planning framework consists of layers of planning controls that act in conjunction to achieve a strategy. The primary function of planning controls is to regulate land use. This is principally achieved through zoning, which prescribes where particular land uses can be undertaken. The planning controls can also determine development standards, including allotment size, floor space ratios, and heritage controls.

Early planning controls essentially recognised existing land uses and did not provide a strategy for the area. Present day planning controls which govern the use of land in the Study Area are more complex than those of the past and comprise State, Regional and Local planning instruments. This section of the Study will review the history of planning controls in the Study Area and the patterns of development established under these instruments.

2.1 Review of Historical Planning Controls

The history of planning controls is important in providing an understanding of the historical development of the area and the evolution of planning philosophy relevant to the area. The planning history of rural areas within the Shire can be considered in three primary phases, namely:

- * Settlement to 1945 - No specific planning controls in existence;
- * 1945 to 1977 - Planning controls recognised and conformed to existing land uses; and
- * 1977 to 1994 - Local planning controls and increasing environmental awareness.

2.1.1 Settlement to 1945

The first phase of planning in the area commenced with European settlement in 1788 and continued until 1945 during which period no formal planning controls were implemented and informal planning was undertaken by the Crown. Between settlement and 1935, the Crown issued land grants in the rural areas of the Shire. In the 1880's, subdivision proposals were assessed by the Crown Lands Office, with the lot sizes determined at the owner's discretion and by market forces.

In 1906 the Shire of Hornsby was proclaimed and responsibility for land use decisions was vested with local government. The Local Government Act was introduced in 1919, and for the first time, the role and function of Local Government including roads, garbage, public health, building regulation and subdivision regulations were defined. Whilst the Act allowed Councils to assess subdivision applications, it did not prescribe any detailed standards and decisions were often made on an informal basis. The implications of these informal decisions is still evident in some of the unusual subdivisions patterns and allotment sizes.

2.1.2 1945 to 1977 Recognition of Land Uses

The second phase of planning in the rural areas of the Shire commenced with the introduction of the first comprehensive legislation relating to town and country planning in NSW. The Local Government (Town and Country Planning) Amendment Act (1945) introduced Part XIIA of the old Local Government Act. The amendment provided for the preparation of town and country planning schemes to control land use. Under the Act, the Cumberland County Council was authorised to prepare a regional land use plan for the County of Cumberland (Sydney Basin) which was to be supplemented by more detailed planning undertaken by the individual local Councils.

The County of Cumberland Planning Scheme prepared by the County Council was gazetted in 1951. The scheme was the first attempt at regional land use planning in the Sydney Metropolitan Area and applied to the majority of the Sydney Basin. The scheme placed significant emphasis on prevailing land uses. Under the Plan, the suburbs of Galston, Round Corner, Glenorie, Maroota and Wisemans Ferry were depicted as "village" areas with the surrounding rural lands, zoned "rural area". A "green belt" area was defined through Castle Hill, West Pennant Hills and along Berowra Creek which separated the "rural area" from the "living area" or urban area. The village areas permitted typical urban uses such as housing, churches, shops and local light industries. The rural area permitted uses such as agriculture, country dwellings, rural industries and extractive industries.

Under the Plan, a country dwelling could be built on a rural property having a minimum area of 2 hectares (5 acres). This standard was varied for only eleven (11) site specific properties in the rural areas between 1952 and 1962. In 1962 the

standard was varied for the rural areas to the north of Arcadia requiring properties to be at least 10 hectares (25 acres) for the erection of a country dwelling.

As was the case with the 2 hectares standard, there were also variations to this standard for specific properties in the ensuing years. The distinction between the minimum area to erect a country dwelling to the north and south of Arcadia, represented the first division in development standards in the rural areas of the Shire.

During the period from 1951 to 1977, the zoning and land use provisions of the County of Cumberland Planning Scheme were amended through the suspension of the scheme and from 1962 onwards, the use of Interim Development Orders (IDO). IDO's were a mechanism to control land use, pending the gazettal of local planning schemes with more specific controls.

Two amending IDO's expanded residential development within the rural areas of the Shire. IDO No. 25 (1973) enabled residential development on the eastern side of Glenorie between Cairnes Road and Taupo Road, although the subdivision did not occur until 1976/77. This eastern boundary to Glenorie has remained unchanged since the village subdivision. IDO No. 29 (1975) enabled the westward extension of Galston Village between Sylvan and Johnson Roads by allowing residential development within this area. At the same time, a strip of land some 15m wide fronting Mid-Dural Road was zoned Open Space as a buffer between the road and the residential development.

Hornsby Council commenced the preparation of a local planning scheme in 1962. In 1965, Council completed a scheme that generally followed the County of Cumberland Planning Scheme but contained more detailed land use controls. The draft Hornsby Planning Scheme Ordinance (HPSO) was exhibited in 1968, however it was a further 9 years until the final scheme was gazetted in 1977.

Corresponding with the preparation of the HPSO, the Sydney Regional Outline Plan was introduced in 1968. The Plan, being an advisory rather than statutory document, was the second attempt at regional planning for Sydney and provided a strategy for the development of the Region with a horizon to the year 2000. As a response to pressure for further urban expansion, the plan nominated the Castle Hill - Cherrybrook West

Pennant Hills Green Belt area, established under the County of Cumberland Planning Scheme, as an urban release area for development between 1975 and 1985.

In 1973, the State Planning Authority issued Circular No. 76 - Sydney Region Policy relating to subdivision and residential development in non-urban zones. The circular recommended the introduction of a 40 hectare minimum allotment size for non-urban lands to prevent the fragmentation of agricultural lands as a consequence of land speculation. The Circular also promoted the substitution of the term "country dwelling" with "dwelling house".

2.1.3 1977 to 1994 - Local Planning Control and Environmental Awareness

In 1977, the Hornsby Planning Scheme Ordinance (HPSO) was gazetted replacing the County of Cumberland Planning Scheme. The HPSO represented the first comprehensive local planning scheme for the Shire. The HPSO zoned the village areas as Residential (a1) and the rural areas as Non Urban A and B. The land uses permitted within both rural zones were similar. The Non Urban A zone applied to land generally north of Arcadia permitting dwellings to be erected on properties of at least 10 hectares, while in the Non Urban B zone, to the south of Arcadia, dwellings were permitted on properties of 2 hectares. The boundary and standards within these zones reflected the distinction established in 1962 between the areas to the north and south of Arcadia.

The HPSO also introduced the Open Space (Roadside Reservation) zone which was a 15m wide zone that applied to properties fronting main roads. The philosophy of the zone was to maintain the character of the rural areas in the Shire by maintaining large building setbacks and allowing for the possibility of future road widening.

In 1977, the Planning and Environment Commission issued Circular No. 13 - New Zoning Policy for Land Outside Urban Areas. The Circular promoted the replacement of the term "Non-urban" with "Rural" and the introduction of "Environmental Protection" zones for sensitive lands. These zones were considered and introduced through a review of the Rural Lands undertaken during 1978, although the recommendations of the review were not gazetted until 1985.

The nature of the southernmost rural area of the Shire began to alter during 1978 with the rezoning of the first stage of the Cherrybrook Urban release area to permit urban development (IDO No 36). IDO No. 36 covered the area between Kitchener Road and Edward Bennett Drive to Gumnut Road. The second stage was rezoned a year later which extended the residential zoning to Purchase Road (IDO No. 47). The third and fourth stages occurred in 1984 and 1986 (LEP's No's. 44 and 63) and extended the release area to its current boundaries of Old Northern Road, Hastings Road (eastern side) and land to the north of Georges Creek.

In 1979, the Environmental Planning and Assessment Act was gazetted and replaced the planning controls of the Local Government Act, 1919. The Act featured a greater emphasis on the environment and introduced Local Environmental Plans (LEP's) in place of planning schemes as the mechanisms to control the use of land.

As noted above, Hornsby Council commenced a review of the planning controls for the rural areas in 1978, which resulted in the gazettal of LEP No. 10 in 1985. LEP No. 10 significantly changed the planning controls in the rural areas. The LEP introduced zones and controls which reflected the land capability of the area. For example, the LEP introduced five (5) Environmental Protection zones, namely; wetlands, scenic, valley/escarpment and two tourist zones. The Environmental Protection (wetlands) zone restricted development in wetland areas. The Environmental Protection (scenic) zone applied to steep lands visible from the Hawkesbury River with the aim of protecting the scenic amenity and landscapes. The Environmental Protection (valley/escarpment) zone applied to steep lands, generally in excess of 20%, within the rural area. The two Environmental Protection (tourist) zones permitted tourist development on land near the Hawkesbury River, the difference between the 2 zones relating to the extent of flood inundation. The Tourist (L1) zone permitted tourist/recreation development including that involving habitation, whereas the Tourist (L2) zone permitted tourist/recreation development of a non-habitable type, being more tolerable to flooding. The introduction of the Environmental Protection zones represented the first time where land use direction within the Shire more accurately reflected land capability rather than land uses.

LEP No. 10 also renamed the Non-Urban A and B zones to Rural (c1) and (c2), respectively, although, the minimum allotment size in these

zones remained 10 and 2 hectares, respectively, with land uses permitted remaining similar. A Rural (d) zone was also introduced in the Cherrybrook-Dural area with a minimum allotment size of 40 hectares. The objective of this zone was "to prevent premature urban development in future release areas". LEP No. 10 also introduced controls relating to the protection of Aboriginal sites and heritage items, offensive or hazardous industries, building lines to main roads and development on flood prone land. The National Parks and Nature Reserves zone which applies to Marramarra National Park was also introduced with the gazettal of LEP No. 10.

A further review of the zoning controls occurred in 1986 for land adjacent to the Hawkesbury River. This resulted in the gazettal of LEP No. 51 in 1987 which adjusted the boundaries of the Environmental Protection zones along the Hawkesbury River, introduced a 30m foreshore building line and listed additional Heritage items located along the river.

In 1987, a Service Centre zone was established at Dural, in the area now referred to as the Dural Service Centre. LEP No. 58 rezoned the lands from Rural (d) to Special Business (Service Centre) to promote development which would service the rural areas to the north and the rapidly developing Cherrybrook residential area to the south. Development was restricted due to the absence of a sewerage system to service this area. The planning provisions were reviewed in 1991, following the construction of a sewerage system to the southern portion of the centre, and resulted in the gazettal of LEP No. 94 (1992) and the preparation of a Development Control Plan.

In 1988, the Department of Planning published the third Sydney regional strategy entitled "Sydney into its Third Century" (Department of Planning 1988, updated 1989). The publication provided "a policy framework within which major government agencies could make decisions, allocate resources and co-ordinate their activities". The strategy encouraged a more compact city partly in response to the high costs associated with the provision of infrastructure and recognised the need to preserve viable agricultural land. The strategy noted that large sections of the Study area were subject to primary constraints to development, including prime agricultural lands, steep terrain, distinctive scenic areas, and Marramarra National Park (p:30). The area between Dural and Galston was identified as not being subject to these primary constraints (p:31). Nevertheless, the Study area was not identified as

an area for future urban development, with an alternate preference for the areas of Rouse Hill, Marsden Park, Londonderry, Bringelly and Macarthur South.

In 1990, Sydney Regional Environmental Plan (SREP) No. 20 - Hawkesbury Nepean River was gazetted. The Plan provided a regional framework for planning controls throughout the Hawkesbury - Nepean catchment. The provisions of SREP No. 20 will be discussed in more detail later in this chapter.

In 1990, the Department of Planning prepared the Sydney Land Audit. One of the purposes of the audit was to identify land with urban potential. The audit identified land within the study area that may be capable of urban development. However, it remains Council's responsibility to evaluate the capability of these lands for urban development and balance this against other factors.

In 1994 the Department of Planning reviewed "Sydney into its Third Century" and published "Sydney's Future - A Discussion Paper on Planning the Greater Metropolitan Region" (Department of Planning, 1994).

A complete review of the Hornsby Planning Scheme commenced in 1992. The review sought to rationalise, simplify and update the planning provisions of the then 15 year old Scheme. The review resulted in the gazettal of the Hornsby Shire Local Environmental Plan in July 1994, which repealed the Planning Scheme. The major changes for the rural areas was the renaming of the Rural (c1) and (c2) zones to Rural A and B, respectively; the amalgamation of the Environmental Protection - Scenic and Valley/Escarpment zones to Environmental Protection B - (River Catchment) and the replacement of the Open Space - Roadside Reservation zone with the 15m landscape setback provision subsequently incorporated into the Rural Lands (Interim) Development Control Plan. The Hornsby Local Environmental Plan 1994 and Rural Lands (Interim) DCP will be discussed in more detail in the following section.

2.2 Current Planning Controls

The current planning controls that apply in the study area are the culmination of an evolutionary process. Initiated with the sole responsibility vested in the Crown, this process has been and continues to be defined through the on-going re-definition of responsibility for the management of

land uses between the three levels of government. The consequence of this evolution is a complex planning framework, with overlaying controls and strategies at the Federal, State and local government levels. These layers are necessary as part of the process of strategic planning, the objectives of which cannot be achieved by a single governmental agency and represent the best means to provide planning controls that are dynamic and responsive to change. The various Acts, instruments and guidelines used by the different levels of government to manage land uses in the study area are addressed below and in other relevant sections of this study.

2.2.1. Federal Government

In 1992 the Federal Government introduced the National Strategy for Ecologically Sustainable Development (ESD) (Commonwealth of Australia, 1992). The provisions of the Local Government Act (1993) and the Inter-governmental Agreement on the Environment require Councils to consider ESD. The strategy defines ESD as:

"using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased".

Essentially the strategy aims to conserve our ecosystems for the benefit of future generations and promotes measures for the sustainable use of environmental resources. The practical objectives of ESD doctrine include changing our patterns of resource use, with the goal of improving the quality of our air, land and water, in conjunction with a greater emphasis on environmentally friendly products and processes.

The principles of ESD are not new to land use management in NSW and were first introduced with the implementation of the Environmental Planning and Assessment Act (EP & A Act) in 1979. Among the objectives of the EP & A Act is the promotion of a balance between environmental protection and economic/social welfare. A number of requirements and instruments under the Act have served to promote ESD principles, including Sydney Regional Environmental Plan No. 20 (SREP No. 20) - Hawkesbury Nepean River, which aims to control the water quality of the River. The policy nominates wetland areas and provides controls and guidelines for development within the catchment of the Hawkesbury Nepean River. At

the local level, the Hornsby Shire Local Environmental Plan (HSLEP), 1994, includes an objective "to improve opportunities for ecologically sustainable development" and an Environmental Protection B (River Catchments) zone which applies to sensitive lands within the catchment of the Hawkesbury Nepean River. Hornsby Council has also agreed with the other signatories of the Statement of Joint Intent for Berowra Creek to achieve ESD in that catchment.

There are two primary components of ESD to ensure development of land adopts a sustainable approach. The first is that an integrated assessment incorporating the wider economic, social and environmental implications of decisions and actions is used as the basis of the decision making process. The second is that a long-term rather than a short-term view is adopted.

Underlying these two components in determining appropriate decisions and actions is the "precautionary principle". This principle advocates that where there is a potential threat to the environment from development, a lack of conclusive scientific certainty on possible environmental impacts should not be used as a reason to postpone measures to prevent environmental degradation.

In the context of the current review of development controls for rural lands within the Shire, it is appropriate that the principles of ESD be incorporated into the decision making process. This can be achieved through a review of the social, economic and environmental characteristics of the rural lands. Decisions taken as a result of this assessment should be made with a view to long term ecological sustainability with particular emphasis given to avoiding the possibility of environmental degradation in accordance with the "precautionary principle".

2.2.2 Regional

Today, regional planning for the Sydney area is undertaken by the Department of Urban Affairs and Planning (DUAP) in conjunction with local councils. The use and management of land by statutory authorities in NSW is principally governed by the Environmental Planning and Assessment Act, 1979. The objects of the Act provide the framework for its implementation and are relevant to this study, as follows:

"* to encourage -

- *the proper management, development and conservation of natural and man-made resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment;*
- *the promotion and co-ordination of the orderly and economic use and development of land;*
- *the protection, provision and co-ordination of communication and utility services;*
- *the provision of land for public purposes;*
- *the provision and co-ordination of community services and facilities; and*
- *the protection of the environment;*
- * *to promote the sharing of the responsibility for environmental planning between the different levels of government in the State; and*
- * *to provide increased opportunity for public involvement and participation in environmental planning and assessment."*

In 1995, the DUAP published its fourth planning strategy for the Sydney Region, entitled "Cities for the 21st Century".

The document provides a strategy for the integrated management of the Sydney, Newcastle, Central Coast and Wollongong regions. The key principles that underpin the vision for the regions and lay the groundwork for more detailed strategic policies and actions are:

- * **more compact cities:** by taking up less new land, maximising the use of existing infrastructure, providing better transport links and locating housing in proximity to these services and employment.

A planning tool that serves this principle and relates to the future form of the study area is the Sydney Region Urban Development Programme (UDP). The UDP is a land release system, managed by the Department of Urban Affairs and Planning. Its role is to monitor the urban release of land on Sydney's fringes such as the Rouse Hill release area and provide guidance on when and where development will occur.

For the next 10 to 15 years, all housing that will be necessary on the fringes of Sydney

will be built on land already incorporated in the UDP and situated mainly in the south and north west of the Sydney region. In a regional context, the urban release of land within the study area will not be required within the time frame of this study.

- * **an ecologically sustainable region:** draws on the principles of ecologically sustainable development (ESD) and involves integrating economic growth with environmental protection and pollution control. The Hawkesbury-Nepean Basin which includes the majority of the study area is nominated in the strategy as an ecologically sustainable region, with continued residential development within the catchment of the Hawkesbury-Nepean River cited as a major contributing factor in blue-green algae blooms affecting the River.
- * **effective strategy implementation:** by facilitating consultation and team work between State and local government as well as community participation.

The importance of the final principle and the need for effective communication between State and local government is pivotal to the strategy. In this respect, the rezoning of land under the Environmental Planning and Assessment Act, 1979, requires the Minister's approval. This ensures that the decisions of Councils are consistent with the principles of this and other State and Regional strategies.

To implement this strategy and previous strategies, the Department of Urban Affairs and Planning uses regional planning controls contained in State Environmental Planning Policies (SEPP's), Regional Environmental Plans (REP's) and Ministerial Directions. Both SEPP's and REP's generally override local controls.

State Environmental Planning Policies

State Environmental Planning Policies (SEPP's) are government planning policies which generally apply statewide. Of the 43 SEPP's, 14 influence development within the Study area, with different SEPP's being relevant to different types of activities. For example, SEPP No. 5 permits housing for aged or disabled persons to be erected on land zoned for residential purposes and certain land zoned for special uses. A more detailed description of the SEPP's is contained in Appendix B.

Regional Environmental Plans

Regional Environmental Plans (REP's) also detail State Government planning policy, however they typically apply to certain areas or regions. There are two REP's of relevance that apply to the Study Area, namely Sydney REP No. 9 "Extractive Industries" and Sydney REP No. 20 - "Hawkesbury - Nepean River".

SREP No. 9 - Extractive Industries, identifies the Maroota sand deposit as being a resource of regional significance in both Hornsby and Baulkham Hills Council areas. The Plan details controls to guide extraction and prevent sterilisation of the resource.

SREP No. 20 - Hawkesbury Nepean Rivers, provides for a Total Catchment Management approach to planning within the catchment of the Hawkesbury Nepean River and provides a framework for the preparation of Local Environmental Plans (LEP) and Development Control Plans (DCP). It ensures that the planning of areas within the catchment of the Hawkesbury and Nepean Rivers is considered in the context of the wider river system.

Clause 8 of SREP No. 20 states:-

"In preparing a River Management Plan applying to land to which this plan applies, the consent authority or the Director shall take into consideration -

- (a) *any relevant head of consideration in Schedule 4, namely*
 - * *water quality;*
 - * *significant vegetation habitats;*
 - * *extraction;*
 - * *heritage items;*
 - * *scenic quality;*
 - * *agriculture;*
 - * *recreation and tourism.*
- (b) *the REP planning report; and*
- (c) *any representations made by a public authority."*

Each of these matters will be addressed in this Study and all land use and zoning proposals will be formulated having regard to the relevant matters for consideration. A copy of Schedule 4 is attached as Appendix C. SREP No. 20 also lists 4 heritage items near Wisemans Ferry and identifies wetland areas considered to be of regional significance.

The report accompanying SREP No. 20 notes that the Lower Hawkesbury provides the greatest tourism potential and that tourism facilities should be encouraged to locate in areas adjoining existing villages. The Report also establishes tasks and responsibilities for the various authorities which have an influence on the river system. The Department of Urban Affairs and Planning is currently reviewing SREP No. 20.

In 1993, the Hawkesbury Nepean Catchment Management Trust was established to coordinate the management of natural resources throughout the river catchment in order to achieve a healthy and productive river system. Amendments to SREP No. 20 will provide the Trust with concurrence and consultation roles for certain development and activities within the catchment. During the preparation of this study Council consulted with the Trust, which requested consideration of the following issues:

- * the reduction in the quality of water, air and vegetation resources from activities on rural lands, including cumulative impacts;
- * the processes available to achieve sustainable use of natural resources in the study area;
- * the extension of the study area boundaries, as they relate to water management issues, be extended to include the whole of the Berowra Creek catchment; and
- * the retention of the scenic value of the rural areas especially when viewed from the river.

These requests will be considered under the relevant sections of the study. With regard to the third request, it was not considered appropriate to extend the boundaries of the study area to cover the entire catchment as this study is focused upon the rural portion of the Shire and is intended as a planning study rather than a detailed environmental assessment of the area. Notwithstanding, the study adopts the principles of total catchment management. The water quality of the entire Berowra Creek catchment is being considered as part of Hornsby Council's Water Quality Monitoring Program, from which water quality data used in this study has been extracted.

Ministerial Directions

Directions from the Minister for Urban Affairs and Planning issued under Section 117 of the EPA Act, also apply to the Study area. In general terms, the directions obligate Council's to consider specific matters in the preparation of LEP's to ensure compliance with Government

Policy. The matters include land uses permitted under certain zonings, heritage and environmental factors such as bush fire hazard, floods and sensitive habitats. A summary of Ministerial Directions relevant to the study area is contained in Appendix B.

The most relevant Direction to this Study is Direction G8 - Rural zones, which requires Councils preparing Draft LEP's for rural zoned land to:

- * *Retain provisions, enabling the erection of a dwelling house on an existing allotment;*
- * *Retain existing zones and provisions relating to the control of traffic generating development or access to major road frontages;*
- * *Not rezone land for urban purposes, unless:*
 - *justified by an environmental study; or*
 - *in accordance with the Sydney Region Urban Development Program; or*
 - *the rezoning is of a relatively minor significance;*

A number of other Government Departments and Authorities have also introduced policies, directions and guidelines that affect the use of land within the study area. These policies will be addressed in relevant sections of the study. The policy that is most relevant to this study is NSW Agriculture's Policy on the Protection of Agricultural Land (NSW Agriculture, 1993). The policy has as its basis the concept of Sustainable Agriculture. A fundamental component is conserving natural resources to maintain their long term productive potential for the community as a whole. The policy recognises that land suitable for agricultural production is a limited resource and is being threatened by non agricultural uses.

The policy advocates that environmental planning policy for Local Government Areas and Regions should:-

- * consider the agricultural productivity and suitability of the land and the nature and requirements of agricultural industries in the area;
- * promote the continued use of agricultural land for agricultural purposes, where that form of land use is sustainable in the long term;
- * avoid land use conflicts
- * protect water resources for commercial, recreational, environmental and agricultural uses;

- * deregulate development consent procedures for agricultural land subdivision and transfer, where continued agricultural use of the land is to occur;
- * provide a diversity of rural living opportunities in appropriate locations or provide scope for development in rural areas; and
- * retain capacity to effectively cater for specialised agricultural developments.

2.2.3 Local Planning Controls

Land use and zoning within the Study Area is controlled at the local level by zoning and regulatory provisions embodied in the Hornsby Shire Local Environmental Plan, 1994 (HSLEP) and supplementary Development Control Plans.

Hornsby Shire Local Environmental Plan

The Hornsby Shire Local Environmental Plan (HSLEP) was gazetted in July 1994 and replaced the Hornsby Planning Scheme Ordinance (1977) as the principal mechanism for the regulation of land use within Hornsby Shire. The aims of the Plan are:

- a) to provide an updated and simplified plan for the area of Hornsby; and
- b) to protect and enhance the environmental qualities of the area; and
- c) to facilitate the orderly and economic development of land within the area; and
- d) to promote the well-being of the area's population.

The objectives of the Plan are:

- a) to provide a land use framework for the preparation of detailed development control plans; and
- b) to protect environmentally sensitive areas and the heritage of the area; and
- c) to improve opportunities for ecologically sustainable development; and
- d) to provide for the cultural needs of and the equitable provision of services and facilities for the community.

Under the HSLEP, there are currently seven principal zones which apply to the Study Area, comprising Rural, Residential, Business, Special Uses, Open Space, Environmental Protection and National Parks and Nature Reserves zones (Figure 2.1). There is no land zoned for industrial purposes within the Study area. Each

of the zones and other provisions of the HSLEP are briefly discussed below.

Rural: There are two rural zones, namely Rural A and Rural B, which cover 4,913 hectares and 3,746 hectares, respectively. The Rural A zone applies to lands generally north of Arcadia and Glenorie which were considered to be suitable for large scale agricultural production and not suitable for urban development due to lack of infrastructure. The Rural A zone has the following objectives:

- (a) to ensure that existing or potentially productive land is preserved;
- (b) to provide for a range of compatible land uses which maintain the rural environment of the area; and
- (c) to ensure development is carried out in a manner that improves the environmental qualities and is within the servicing capacity of the area.

The zone has a minimum allotment size of 10 hectares and permits the erection of a dwelling or attached dwelling on each allotment, agriculture and aquaculture activities, extractive industries, home industries, rural industries, roadside stalls, stock and sale yards, veterinary hospitals, and a range of community facilities.

The Rural B zone applies to land south of Arcadia and Glenorie to Dural. This area is closer to the urban area of the Shire and has a greater availability of services and facilities. When introduced, the zone was also influenced by the general availability of town water. The zone was intended to be used for smaller scale agricultural activities, including hobby farms. However, the character of some of these areas has changed to rural residential with large dwellings surrounded by lawns, pools, tennis courts and landscaping becoming more prevalent. The zone has the following objectives:

- (a) to encourage the preservation of existing or potentially productive agricultural land;
- (b) to provide for a range of compatible land uses which maintain the rural environment of the area and support the urban populace; and
- (c) to ensure development is carried out in a manner that improves the environmental qualities and is within the servicing capacity of the area.

The zone has a minimum allotment size of 2 hectares and permits camp or caravan sites,

education establishments and hospitals, in addition to those in the Rural A zone.

Under the HSLEP, development consent is not required for agriculture in the rural zones unless it involves the clearing of bushland. Agriculture is defined as:

- "(a) the cultivation of crops, including cereals, fruit, vegetable or flower crops;*
- (b) the keeping of breeding of livestock, bees or poultry and other birds; or*
- (c) the cultivation of plants in a wholesale plant nursery, for commercial purposes."*

This definition is all encompassing and does not distinguish between the intensities of uses. For example, intensive horticulture, feedlots, orchards and the grazing of cattle do not require development consent, however they have dissimilar impacts on the environment and the amenity of residents or adjacent properties.

Residential: The Residential A (Low Density) zone in the rural areas of the Shire applies to some 68.5 hectares, being the villages of Dural (7.36ha), Galston (37.3ha), Arcadia (4.14ha), Glenorie (16.7ha) and Wisemans Ferry (1.7ha) and to an allotment at Gentleman's Halt (1.25ha). The Residential A zone applies to the majority of low density urban areas within the Shire.

The zone permits low density residential development and uses compatible with residential areas including child care centres, community facilities, schools, churches and recreation activities. The zone does not generally permit commercial activities with the exception of home occupations and veterinary clinics. The zone has a minimum allotment size of 500m² and a multi-unit housing density standard of 1 dwelling per 350m², with a maximum floor space ratio of 0.4:1. The subdivision of multi-unit housing development is no longer permitted as a consequence of amended State Government Policy which has been emulated by Hornsby Council.

Commercial: There are 2 business zones within the Study Area, namely the Business C (Neighbourhood) and Business E (Service Centre) zone, which apply to land at Galston, Wisemans Ferry and the Dural Service Centre. A summary of the characteristics of these centres is provided in Table 2.1. Additional commercial centres are located at Round Corner, Dural and Glenorie, although these are located outside the study area, within Baulkham Hills Shire.

As the name suggests, the Neighbourhood Business zone permits commercial uses that meet the everyday convenience shopping needs of the immediate community, as well as allowing offices for real estate agents, banks and the like. Health consulting rooms, restaurants, service stations, nurseries, recreation facilities and residential development are also permitted in the Neighbourhood Business zone.

The Business E (Service Centre) zone which applies to the Dural Service Centre fronting New Line and Old Northern Roads, permits a range of service and light industrial activities as well as a limited range of shops. The zone was introduced to permit activities required to service the rural areas to the north and the developing urban area of Cherrybrook to the south. The planning provisions for this area were reviewed in 1991-92 which resulted in amendments to the permitted land uses and the introduction of the Dural Service Centre Development Control Plan.

Special Uses: There are 2 Special Use zones which apply to the Study Area, namely Special Uses A (Community Purposes) and B (Transport Corridor). The Special uses A (Community Purposes) zone is common to the Study area and applies to a range of community uses including schools, cemeteries, community halls and infrastructure facilities such as water reservoirs and electricity substations.

Table 2.1

Summary of Commercial Centres

Centre	Zone	Floor space ratio	Area (ha)	No. properties
Galston Village	Business C	0.5:1	1.62	9
Wisemans Ferry	Business C	0.5:1	0.76	2
Dural Service Centre	Business E	0.7:1	36.52	24

(Source: Hornsby Shire Council)

The Special Uses B (Transport Corridor) zone applies to main roads and nominates areas for future road widening and realignment. The zone applies to Old Northern Road, Galston Road, Mid-Dural Road, Arcadia Road (from Galston Road to Gibbenmount Road and Blacks Road to Bay Road), Bayfield Road, Bay Road and Blacks Road (from Bayfield Road to Arcadia Road).

Open Space: There are 3 open space zones which apply to the Study Area, namely the Open Space A (Public Recreation - Local), Open Space B (Public Recreation - District) and Open Space C (Private Recreation) zones. The Open Space A zone applies to most open space areas within the Study area including the Arcadia, Dural, Galston, Glenorie and Wisemans Ferry parks and numerous other public reserves including bushland areas. The uses permitted in the zone include community, recreation and entertainment facilities, camping or caravan parks, agricultural activities, cemeteries and child care centres.

The Open Space B (Public Recreation - District) zone applies to Berowra Valley Bushland Park (3,800ha), Fagan Park (55ha), the Dural State Forest (24ha) and other smaller parcels of land. The three listed reserves are of regional significance which is reflected in the zoning. The other miscellaneous parcels are located adjacent to Berowra Valley Bushland Park or Marramarra National Park and have been previously identified for possible inclusion in these reserves. The Department of Urban Affairs and Planning are the responsible authority for the acquisition of these lands. The zone permits the same uses as the Open Space A (Public Recreation - Local) zone.

The Open Space C (Private Recreation) zone applies to the Wisemans Ferry Bowling Club. The zoning permits the use of the land for privately owned sporting facilities.

Chapter 11 provides a review of the adequacy of open space areas and accompanying facilities in relation to the existing and future recreational needs of the population.

Environmental Protection: Four Environmental Protection zones apply within the Study area. These are Environmental Protection A (Wetlands), Environmental Protection B (River Catchment), Environmental Protection C (Tourist) and Environmental Protection D (Recreation) zones.

The Environmental Protection A (Wetlands) zone applies to wetlands and significant mangrove stands along the Hawkesbury River and Berowra Creek. The zone includes wetlands protected under SREP No. 20 - Hawkesbury Nepean River. The zone aims to protect the ecological value of wetlands and assist in the maintenance of acceptable water quality in the Hawkesbury River whilst allowing compatible development. Development permitted with Council consent includes agriculture, aquaculture, works for drainage purposes or works that promote the scientific or educational value of wetlands. The zone has a minimum allotment size of 40ha per allotment.

The Environmental Protection B (River Catchment) zone represents the amalgamation of the former Environmental Protection- Scenic and Valley/Escarpment zones. The zone applies to steep and visually significant land within the Study area and aims to protect these sensitive areas. The zone permits one dwelling or two attached dwellings per allotment, with a minimum allotment size of 40 hectares. Also permitted are agriculture, recreation facilities, utility installations and works for the purposes of landscaping, gardening and bushfire hazard reduction.

The Environmental Protection C (Tourist) zone applies to 9ha of land which is partially flood prone at Wisemans Ferry. The zone permits similar uses to the Environmental Protection B zone whilst also permitting tourist facilities. The zone has a minimum allotment size of 1,000m² and a floorspace ratio of 0.3:1.

The Environmental Protection D (Recreation) zone applies to 2 properties (28ha) adjacent to the Hawkesbury River at Wisemans Ferry. Both properties are subject to flood inundation during 1 in 100 year flood events. The zone aims to permit agricultural and recreational development that will tolerate flooding and will not impact upon the Hawkesbury River. For example, recreation areas and camp and caravan site are permitted, while fixed structures are not permitted because of the threat of flooding. The zone has a minimum allotment size of 5 hectares.

As noted previously, Chapter 4 provides a review of the land capability of the Study area, including the identification of sensitive land that should be protected.

National Parks and Nature Reserves: The National Parks and Nature Reserves applies to

two areas within the Study Area, namely Marramarra National Park (13,223 hectares) and the Maroota Historic site (32.65 hectares). This zone recognises the management of these lands by the National Parks and Wildlife Service and permits any purpose authorised by or under the National Parks and Wildlife Act, 1974.

Tree Preservation: Clause 8 of the HSLEP allows Council to make, revoke or amend a Tree Preservation Order. Council has made a Tree Preservation Order which requires persons to obtain Council's permission prior to the cutting or damage to trees covered by the Tree Preservation Order. This includes agricultural activities which require the cutting of trees or bushland.

Landsform Modification: Clause 9 of the HSLEP specifies that Council consent is required for the filling or excavation of land where it is considered that the work will significantly affect the natural environment.

Heritage: Clause 18 of the HSLEP details controls which affect the development of or alteration to the 90 heritage items identified in the Study area (Appendix D).

Bushland Protection: Clause 19 of the HSLEP enables land to be designated bushland protection. The designation currently applies to one property in Matthew Close, Galston, which was introduced via a site specific LEP (LEP No. 99). This overlay zone recognises significant flora and fauna habitats.

Waterways: Clause 20 of the HSLEP, requires Council consent to be obtained for development below mean high water mark. The clause also introduces the controls for the foreshore building line and flood line, which are marked on the zoning maps between Wisemans Ferry and Gentleman's Halt. The foreshore building line is 30m in width and precludes most buildings between the foreshore and this line. The flood line is based on the 1:100 year flood event and requires development consent for all development between the line and the mean high water mark. Additionally, the floor level of habitable buildings on flood prone land is required to be 6m above standard datum.

Development Control Plans

Development Control Plans (DCP's) supplement the provisions of the HSLEP and provide additional controls and guidelines for certain

areas and types of development. Nine DCP's currently apply within the Study area, namely:

- * Rural Lands (Interim) DCP - which was introduced as a temporary measure pending the finalisation of this Study and provides basic guidelines for development in the rural area. The DCP Includes controls for subdivision, attached dwellings, dams, keeping of animals, roadside stalls, rural industries, rural workers dwellings, setbacks, soil and water management, effluent disposal, environmental protection, fire hazard and heritage;
- * Low Density Multi Unit Housing DCP - which provides guidelines and controls for low density multi-unit housing (dual occupancy and cluster housing) in the Residential A zones of the village areas;
- * Residential Subdivision DCP - which provides guidelines for the subdivision of land zoned Residential A and Special Uses A and B, throughout Hornsby Shire;
- * Heritage DCP - which provides guidelines for the conservation and alteration of heritage items and design guidelines within Heritage Conservation Areas;
- * Dural Village DCP - which was prepared in association with Baulkham Hills Council and provides a strategy for future residential and retail development in the Dural Village area;
- * Outdoor Advertising DCP - which provides guidelines for the provision of signage in association with businesses in the neighbourhood business and service centre zones.
- * Draft Extractive Industries - Maroota DCP - which was prepared in association with Baulkham Hills Council and provides controls for extractive industry development within the area at Maroota covered by Sydney Regional Environmental Plan No. 9; and
- * Draft Dural Service Centre DCP - which provides guidelines for development on lands zoned Business E (Service Centre) at Dural;
- * Draft Business Lands DCP - which provides guidelines for retail and office development on lands zoned Business C (Neighbourhood) at Galston and Wisemans Ferry.

As mentioned, the Rural Lands (Interim) DCP was introduced as a temporary measure pending the finalisation of this study. Accordingly, as part of this study, the Rural Lands (interim) DCP will be reviewed to incorporate the strategies recommended in this study. Similarly, the content of the other DCP's, which refer to specific areas or issues, may also need to be reviewed.

2.3 Planning Framework Conclusions

The planning framework that applies within the study area has been established as a consequence of the changing roles of the three levels of government in relation to the management of land uses. The ongoing, redefining of these roles is in response to the changing needs and aspirations from the National to the local level and represents a dynamic approach that is responsive to change in the face of an uncertain future.

In this context, local planning controls in the study area were last comprehensively reviewed in the early 1980's. In the intervening period, there have been substantial changes in the social, economic and environmental issues affecting the study area. In recognition of these changes and to meet community aspirations, it is necessary to review the existing planning controls at the local level.

CHAPTER THREE - HERITAGE RESOURCES

The rural area of the Shire originally developed through its agricultural and pastoral potential from the turn of the nineteenth century, approximately 30 years after colonisation. These land uses have continued to predominate throughout the northern area of the Shire, which has lead to the area being known as the "Rural Lands". This chapter will detail a historical overview of the development of the Study area, the individual villages and townships and heritage management issues.

3.1 Historical Overview

It is beyond the scope of this Study to provide a comprehensive history of the area, although a detailed history is available in a number of local history publications. Instead, the Study concentrates on the history of the area as it relates to human occupation, land use and the development of the area.

3.1.1 Aboriginal

Prior to European contact, the area was occupied by two main Aboriginal tribes, including the Dharug's (also spelt Dharuk, Dharruk and Daruk), and the Guringai's. The Aboriginal culture was greatly influenced by the Europeans upon their arrival in the new colony. After approximately fifty years of European occupation, the Aboriginals retreated from the land which had been gradually overtaken by the new settlers, together with the customs and ceremonies that were previously a central part to the Aboriginal culture (Ollif, 1973; Royal Australian Historical Society, 1991a).

Evidence of the Aboriginal occupation is present throughout the Study area, with the most known examples being situated in the northern areas near Maroota, Canoelands and in the Marramarra National Park. Evidence of occupation includes:

- * engravings on sandstone ridges;
- * rock shelters on the valley slopes containing cave paintings or drawing sites and archaeological deposits;
- * open campsites and grinding grooves on valley floors;
- * shell middens along tidal waterways; and
- * scarred trees (Lord, 1987).

A study of Marramarra National Park revealed 700 sites in 11,000ha (now 13200ha), at an

average of 1 site per 6.4km², representing a very high density of sites of both art and occupation (Lord, 1987).

The engraving of the Hawkesbury Sandstone is world famous and is limited to a relatively small area bounded in the north by the Hunter Valley and in the south by Royal National Park (Lord, 1987). Significant engravings, including figures, tracks and axe grinding grooves, are located in Maroota near the junction of Old Northern Road and Laughtondale Gully Road. This site is known as Devil's Rock and is believed to depict initiation rituals (Stanbury and Clegg, 1990). Other significant sites are evident along Old Northern Road and Canoelands Road. Often the Aboriginal engravings in the area depict food sources including wildlife and estuarine animals. This gives an insight to the animals found in the area at the time and the use of the river for fishing. Middens, or mounds of discarded oyster shells, are also evidence of the Aborigines use of the river as a food source.

The names of three townships in the Study area, Berrilee, Dural and Maroota, are believed to be derived from Aboriginal words. Berrilee is said to be a derivation of the Aboriginal words, "Birra Birra", meaning sows and piglets. It is likely that this was named after the farm animals in the area, kept by the first settlers, whereby the spelling later changed to Berrilee (Geelan, 1986). Dural is believed to be taken from the word "Dooral" or its plural "Dooral Dooral", meaning a hollow tree on fire or smoking. The words may have applied to the early land clearing activities employed by the local settlers. (Schofield, 1988). The name Maroota may also have been derived from the Aboriginal words "Maroo" and "ta" meaning "good" and "not" (Ollif, 1973) however this origin is not widely acknowledged.

3.1.2 Early Exploration by Water

Access to remote areas was virtually impossible for the early European explorers due to a lack of facilities for road transport. Exploration was therefore confined to the Rivers as the only accessible means of transport. The Hawkesbury River was one of the first regions explored in New South Wales after settlement in 1788.

Six weeks after the arrival of the first fleet, Governor Phillip led an exploration through Broken Bay in search of a large river to provide fertile land capable of cultivating crops for the colony. A branch of the Hawkesbury River was discovered, however due to a shortage of supplies,

the party was forced to return (Schofield, 1988). The Hawkesbury River was not discovered until the second expedition in the following year.

The second expedition led by Governor Phillip, continued the exploration of the River. Upon discovering that the river was of a substantial size, Governor Phillip named it the Hawkesbury after the Baron of Hawkesbury (Schofield, 1988). The party travelled for 16 days, passing Gentleman's Halt, Laughtondale and Wisemans Ferry, before reaching the fertile plains at Windsor (Hornsby Shire Historical Society, 1978; Ollif, 1973). Windsor became the colony's principal farming district, with the farming area extending for a distance of thirty miles along both sides of the Hawkesbury River. The River provided the major transport route for the farmers and became the lifeline for the delivery of produce to the growing colony. The shoreline also provided a good location for other commercial activities to establish, such as salt production, flour milling and boat building. There is remaining evidence of a flour mill at Singleton's Mill, as the name suggests. Although there are no remaining structures at the site, the foundations of the building are evident as cuttings in the rock where the mill was located in the mid 1830's. This site has archaeological significance and is listed in Council's heritage schedule of the Hornsby Shire Local Environmental Plan (LEP). Another mill may have existed closer to Wisemans Ferry at Mill Creek, however, there is little physical evidence of this.

The River along the north-eastern boundary of the current Hornsby Shire became a familiar site to those transporting goods between Windsor and Port Jackson and a focal point for those establishing industries. (Hornsby Shire Historical Society, 1988). Other examples of early settlements along the Hawkesbury are Wisemans Ferry, and Laughtondale.

3.1.3 Early Exploration by Land

In the period between the two expeditions of the Hawkesbury, an exploration was undertaken of the inland areas. The journey extended westwards from Manly Cove through Narrabeen to an elevated area believed to be between the present Castle Hill and Dural areas (Geelan, 1988).

The lands within the present Hornsby Shire were not occupied in the early days of settlement. More accessible lands along the Parramatta and Hawkesbury Rivers were the preferred settlement areas. Settlement in the study area did not occur

until the early nineteenth century, approximately twenty years after the arrival of the first fleet.

3.1.4 Early Land Grants

Subsequent to the arrival of Governor King in the colony in 1802, a large proportion of the land in the Study area was reserved as Crown land. One of the largest areas he reserved in the Study area encompassed the main ridges from Dural to the Hawkesbury River, including the areas of Dural, Glenorie, Galston, Arcadia, Berribee and Fiddletown, totalling approximately 35,500 acres (16,000 hectares). After the arrival of Governor Macquarie in 1809, Government policy relating to Crown land changed to allow applications for land grants which was implemented in 1817-18. This resulted in many applications for land in what was known as the "Hills areas" (Geelan, 1986).

It was not until 1817 that the first parcels of land in the Study area were granted. They were granted north of Dural, following both the Glenorie Ridge and the Marramarra Ridge. A grant was also made at Portland Head (now Wiseman's Ferry) to Solomon Wiseman. The land was granted mainly to free born sons of convicts or emancipists who were interested in establishing farms in the area. Most grants were of 50-60 acres (20-24 hectares) in size (Schofield, 1988). In the same year, James Meehan surveyed a road from Castle Hill to Galston to provide access to the settlers who were occupying the sites which would later be granted to them. The grants occurred either side of the road between Dural and Galston (Geelan, 1986).

Thomas Best, the son of emancipated convict George Best, was one recipient of a land grant in Dural. Thomas Best cleared his land in Dural for the grazing of livestock and purchased additional land from his neighbours to increase his operations. Similarly, Simon Moulds Junior, also the son of an emancipated convict, settled in the Dural region near to the present junction of New Line and Old Northern Roads. By 1828 he owned 60 acres for the grazing of cattle (Geelan, 1986).

Further north in Galston and Arcadia, land was granted by Governor Macquarie in 1819. A sizable amount of land, 600 acres (240 hectares), was granted to George Hall a free settler destined to create a large pastoral empire. Other more typical grants of 60 acres (24 hectares) were granted in Galston, extending from the corner of Arcadia Road and Galston Road eastwards past the present Bevans Road (Geelan, 1986).

The 1851 census notes that the population of the North Colah Parish totalled 184 persons, occupying 40 houses of weatherboard or slab timber construction with shingled roofs (Geelan, 1986). This area was contained within the boundaries of Old Northern Road from Dural, to Calabash Creek to the north and Berowra Creek to the east, including the townships of Dural, Galston, Arcadia and Berrilee. The only remaining building within the Shire of this period, is the Wisemans Ferry Inn.

The agricultural potential of these lands was realised soon after European settlement and the use of the land for these purposes became crucial to the livelihood of the early landholders. Agriculture has continued to prevail in the study area throughout the nineteenth and twentieth centuries and remains an important livelihood to the many residents.

3.1.5 The Great North Road

In 1825, Heneage Finch surveyed land from Castle Hill to Wisemans Ferry along the ridge to enable a road to be constructed, connecting Sydney with the Hunter Valley. The road was a continuation of Old Northern Road which had been constructed in 1817 from the Government Farm in Castle Hill to the present township of Galston (Geelan, 1986; Schofield, 1988). The new road was named the Great North Road and replaced the old Putty Road which linked Windsor, Putty and Bulga to the Hunter River which is located to the west of Hornsby Shire.

"Chain gangs", convicts wearing iron chains around their legs, worked on the construction of the Great North Road between 1826 and 1831. The road followed the approximate route of the current Old Northern Road to Wisemans Ferry. In 1829, William Govett surveyed another route in an attempt to further reduce the distance between Dural and Sydney. This became New Line Road and still runs between Pennant Hills and Dural, connecting with Old Northern Road.

As the Great North Road continued, it provided access to previously inaccessible lands, and land grants continued to be made along its course until 1832. After this date, land grants ceased and settlers had to buy land from the Government. Just prior to this new policy, a significant grant was made in 1832 to George Acres, a free settler who was also destined to become a major land holder in New South Wales. The grant was 5000 acres (607 hectares) and occupied land either side

of the Great North Road at what was then known as North Dural, between Middle Dural and Glenorie (Hornsby Shire Historical Society, 1979). The settlement that subsequently developed north of this grant was named Glenorie in 1894 (Geelan, 1986; Schofield, 1988).

Despite the time and labour involved in the construction of the Great North Road, it was never very popular because of the great distance it covered to reach the Hunter. Other routes were surveyed and used almost immediately, and in 1850 an alternative road, created by George Peat was officially accepted by the Colonial Government and became known as Peat's Ferry Road. This road later became the Pacific Highway (Hornsby Shire Heritage Study, 1993).

The creation of this new major transport route marked the beginning of the focus of urban development away from the "rural land" areas which still exist today. Had the Great North Road continued to be the main transport route to the Hunter, the resulting land uses would have been vastly different, probably reflecting those currently present along the Pacific Highway.

3.1.6 Timber Cutting

The use of timber as a building and construction material became prevalent soon after the arrival of the first settlers. The areas around Pennant Hills, Castle Hill and Thornleigh were the first areas in Hornsby to be logged due to their accessibility and good quality timber. Gradually the logging progressed northwards into the more rugged lands of the Study area, coinciding with the land grants along the Glenorie and Marramarra Ridges. These ridges are characterised by Wianamatta Shale formations and wet sclerophyll forests providing the sought after hardwoods such as blue gum, blackbutt and iron bark.

The construction of the Great North Road followed the Glenorie ridgeline providing reasonable access and good quality timber. The timber assisted in the construction of the road and provided good building materials for the colony, including roofing shingles (Schofield, 1988; Hornsby Shire Historical Society, 1980).

The remaining land within the Study area is largely underlain by Hawkesbury Sandstone, providing lesser quality soils and timbers for construction purposes. Nonetheless, large sections of these timbers were cleared when the better quality timbers of the Wianamatta Shales were

depleted (Schofield, 1988; Hornsby Historical Society, 1980). Only very small remnants of the original forests remain in the Study area. A turpentine-ironbark community survives at Arcadia in Fagan Park and scribbly gum communities survive in many of the nature reserves in the Study area (Hornsby Shire Heritage Study, 1993).

3.1.7 Agriculture

The cleared land provided a sound area for agricultural operations, initially by the recipients of land grants and later by the free settlers. Although the early settlers had utilised the land for pastoral purposes, it appears that this became a secondary use in favour of the more successful orcharding and poultry farming.

Orcharding commenced in the lower reaches of Epping, Carlingford and Pennant Hills and by the 1860's it had spread to Dural, Galston, Arcadia and Glenorie. Oranges were the primary crops, however the varieties of fruits grown soon expanded to lemons, mandarins, grapefruits, grapes and stone fruits (Schofield, 1988).

By the turn of the century, the Galston, Arcadia, Dural and Glenorie region had developed into one of the best citrus areas in Australia. By this time, the well known names of the Bests, the Moulds, the Roughleys, the Blacks, the Waddells, the Fagans, the Hunts, the Moores and the Knights had established themselves in the area (Hornsby Shire Historical Society, 1980). Produce was also grown along the ridges and transported down rough tracks to the waterways for shipping to the Sydney markets.

In 1907, the State Department of Agriculture established an Orchard Experimental Farm on Galston Road, Dural, to undertake research on the problems farmers were experiencing with the cultivation of fruit trees. This use continued for many years, highlighting the economic importance placed on the citrus industry (Geelan, 1986).

The citrus industry in the area flourished until the depression in the 1930's which severely affected many primary production industries. A large number of the orchards were forced to close down during this period. The local industry also declined as a result of the development of broad acre irrigated orchards in the Murrumbidgee and Murray Valley areas. There was some recovery during the War years, however the industry never

reached the same level of success it had experienced in previous years (Schofield, 1988).

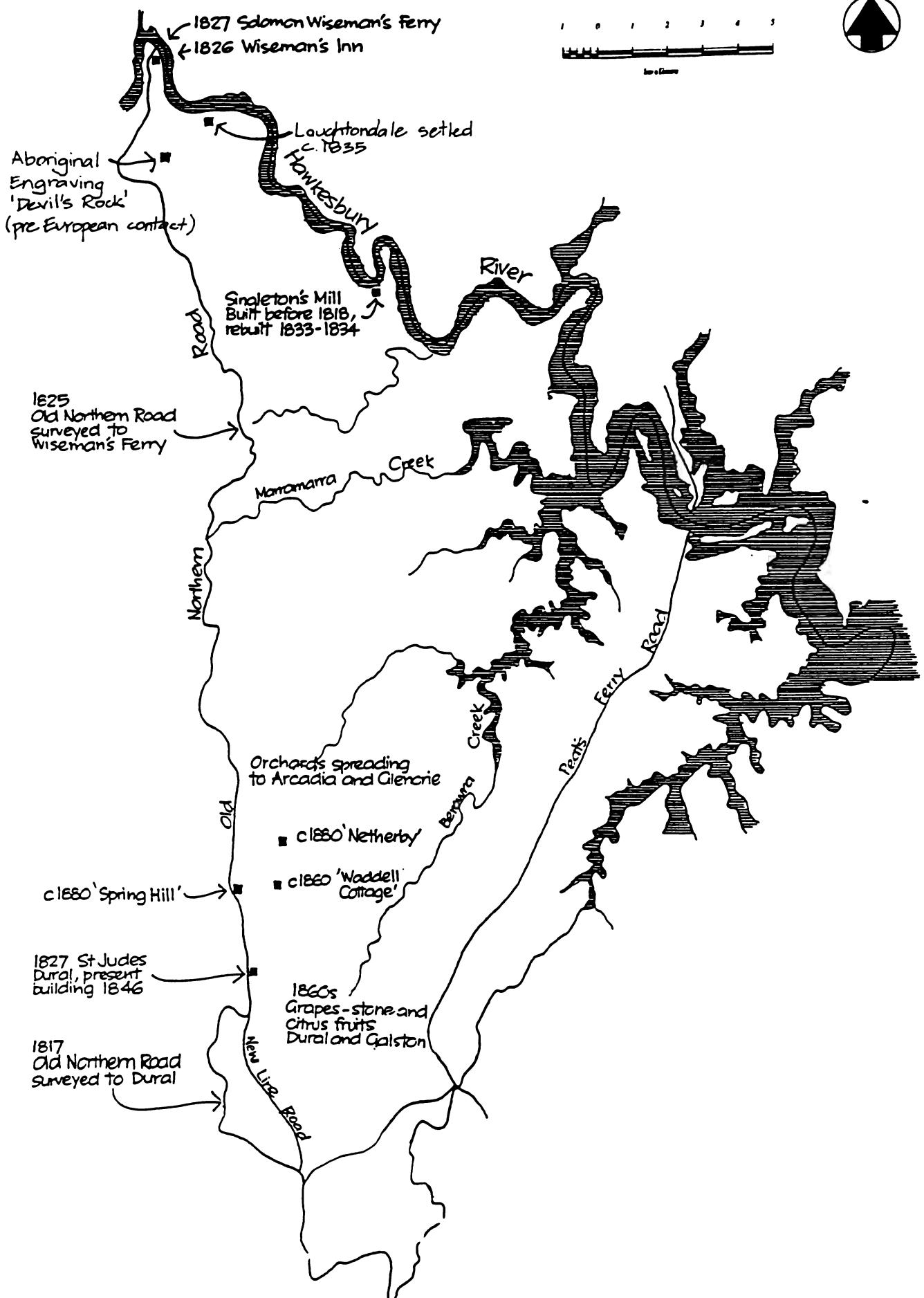
In the 1930's-60's, the plant nursery trade was well established in Epping and Carlingford, including the Hazlewood Brothers, although the pressures of residential development in these areas forced the nurseries further north into Dural, Galston, Arcadia and Glenorie. Large nurseries remain in the area today with well established names including Swanes, Neales, Alpine and Civic Trees which have all operated since the 1960's (Hornsby Shire Heritage Study, 1993).

3.1.8 Rural Subdivision

Mixed farming operated on many of the original land grants well into the late nineteenth century. As the economic viability of the colony increased, the demand for agricultural land was at a premium. The large landholdings were subsequently subdivided and sold off for smaller orcharding operations. These subdivisions occurred from the latter part of the nineteenth century in the Dural, Arcadia and Galston region and early in the twentieth century in the more northern township of Glenorie.

Part of the original land granted to George Hall was subdivided and auctioned in November, 1881, with the remainder being auctioned in 1901. The average allotment sizes in the 1881 subdivision were approximately 25 acres (10 hectares) and in 1901 approximately half this size (Real Estate Auction Posters, 1881 and 1901). Similarly, George Acres' 1,500 acre grant in North Dural was subdivided for sale in the late 1880's (Hornsby Shire Heritage Study, 1993). The auction posters for a majority of the land sales in this area advertised the land as "valuable farm and orchard blocks".

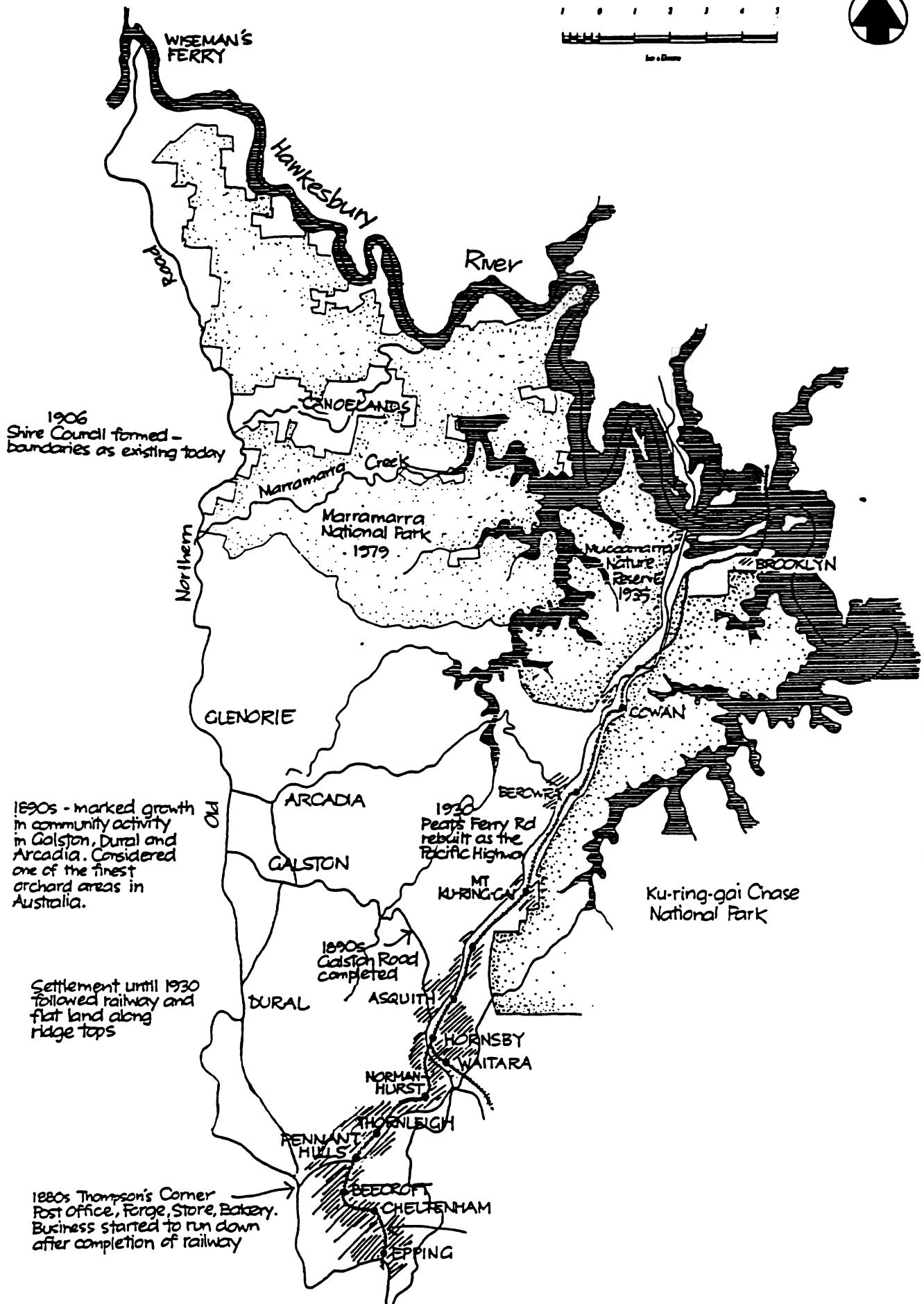
Dural was the first township to develop in the study area, and remains the most established of the ridgeline towns. The Dural township was well established by 1886, accommodating a public school, church, post office, hotel and general stores. Land was offered for sale in the "centre of the thriving township of Dural" as farm and fruit growing blocks (Real Estate Subdivision Advertisement). The land was adjacent to Old Northern Road, near the intersection with Galston Road and has remained the focus of urban development in the Dural area today. The Dural Service Centre has since been established south of the village, in a strip on the eastern edge of New Line Road north of Cherrybrook and provides a



DEVELOPMENT TO 1880

Figure 3.1





DEVELOPMENT FROM 1880 TO PRESENT

Figure 3.2



mixture of services comprising light industry and rural related services. The service centre was formally established in 1987 to provide for the service needs of the rural area and local farming community.

There is limited information available on the development of Glenorie, however, a Public School was established in Glenorie in 1888, indicating that a township was operating successfully at this time. The area is generally flat in topography and was used primarily for orcharding. A Real Estate Subdivision advertisement shows that residential allotments were being auctioned in 1914, forming part of the "Munroe's Orchard Estate".

Galston Road was completed in 1893 and provided a more direct route from Galston to Hornsby Railway for the transportation of produce to Sydney (Geelan, 1988). By 1906, the township of Galston was well established and provided similar services to those in the Dural area. A Real Estate subdivision advertisement offered seven new allotments in this area in 1906, as part of the "Galston Township Estate", reinforcing its status as an established village.

The introduction of the railway system between Sydney and Newcastle in the 1880's, skirting the eastern edge of the Study area, had an indirect effect on the subsequent growth and land use patterns of the Study area. This, together with the use of Peat's Ferry Road, compounded the focus of commercial and subsequent residential activity away from the more productive rural areas.

Subsequent to the major subdivisions of the original land grants, little change in the use of the land was experienced in the first half of the twentieth century. In 1945, planning controls were introduced for the first time, responding to the urban development pressures at that time.

3.2 Historical Overview of Villages and Townships

The following section briefly outlines the history and development of the villages and townships within the rural area, namely Dural, Galston, Arcadia, Glenorie, Maroota, Wisemans Ferry, Laughtondale, Singleton's Mill, Fiddletown, Berrilee, Forest Glen and Canoelands.

3.2.1 Dural

Dural originally encompassed a much broader area than it does today. North Dural was renamed

Glenorie, Upper Dural became Galston, Middle Dural became Kenthurst in part, and Arcadia was formerly Little Dural. The name "Dural" has the same spelling today as it had when entered into Surveyor Meehan's field book in 1817, even though it was subject to many different spellings over the years. (Ollif, 1973)

The Dural township was well established by 1886. Probably the most significant and historic landmark in Dural is St Jude's Anglican Church located on Old Northern Road. The Church is the earliest in the study area, established in 1827 and originally operating in a school building where the St Jude's Parish Hall is now located. The school was also the first to operate in the area.

The present Church building was erected in 1846 and is still in use as a church today. It is located on the highest area of land between the Blue Mountains and the sea, providing clear panoramic views to the Blue Mountains. The church was designed by Colonial Architect Edmund Blacket and is currently protected by the heritage provisions of the Hornsby Shire LEP. Other heritage items identified in the area include the cemetery, many houses, Swanes Nursery and the former Uniting Church.

3.2.2 Galston

The Galston Township developed from a number of early land grants for agricultural production (Geelan, 1988). The Galston Public School, established in 1886, was originally named the North Colah Public School after the Parish name, as the township had no specific name of its own. At a meeting of the residents in the area, the name of Galston was put forward by Alexander Hutchinson, a Scottish resident after a village of the same name and in Ayrshire, Scotland. The name was supported by the residents and officially adopted in 1887 (Schofield, 1988, Powell, 1994). The School still operates today and is included as a heritage item in the Hornsby Shire LEP.

The village of Galston evolved through subdivision in two main stages. In the 1890's, the village was established around the intersection of Galston and Arcadia Roads. At this time, the area was subdivided into 2 hectare allotments and some of the allotments fronting School Road, still remain today. The shopping area along Galston Road was also subdivided at this time, however, it has subsequently been subdivided many times. The second phase of subdivision was the creation

of the smaller allotments ($700m^2$) between 1963 and 1984, which define the village area today.

There has been continued pressure for further expansion of the village since the 1980's. In 1984, the area east of the intersection of Galston and Arcadia Roads, extending east to Bevans Road and north to Knights Road, was the subject of a proposal to reduce the minimum lot size from 2 hectares to 1 hectare. This proposal was considered by Council, however was not supported on the basis of inadequate local infrastructure, particularly roads, public transport and sewerage services. It was also acknowledged that the State Government did not foresee a future urban role for Galston in its Sydney Region Outline Plan.

The potential for residential development of the land on the western side of Arcadia Road, north of the existing subdivision to School Road and east to Johnson Road has been debated since 1968 when Council approved a plan for the Galston Village Area, including an indication of the future development of the subject land. However, the land has been retained as rural, despite the incompleteness of Hansen Avenue, Lackenwood Crescent and Sylvan Street in the existing residential subdivision.

Prior to the construction of Mid-Dural Road, Sallaway Road formed the link between Galston and Middle Dural. Sallaway Road crossed Colah Creek at a causeway adjacent to a waterhole which would have been used for watering stock and horses. The culvert at the causeway has been listed as a heritage item under the Hornsby Shire LEP.

A number of heritage items have been identified in the Galston area, some of which include Galston Public School, Fagan Park, Galston Gorge (buttressing, culverts, water troughs), a number of houses and Waddell Cottage. Waddell Cottage was built in 1886-7 and is one of the oldest standing buildings in the Shire. The sandstone Cottage was built by the son of timber cutter James Waddell, who owned a property which is now occupied by the Galston High School. The McDonald Bridge and the sandstone buttressing at Galston Gorge are considered to have technological significance due to its association with the development of transportation links and road building and should be considered for inclusion in the heritage schedule.

Fagan Park is part of a number of properties established by the Fagan family in the 1850's. It covers an area of approximately 55 hectares and forms part of the original grant to George Hall. The property was originally worked as an orchard and later as a farm and dairy by the Fagan family until the middle of the twentieth century.

The cottage "Netherby" was built on the property by Samuel Fagan in 1899 - 1900 and the surviving outbuildings were built earlier. The property also contains the remains of a brick kiln which provided bricks for the buildings on the property, the Galston Community Centre, and other buildings in the local area (Hornsby Heritage Study, 1992). The property was donated by Bruce Fagan to the Government in 1980 and Hornsby Shire Council became trustee. The property is now used as a regional recreational and educational area and is a well known park throughout northern Sydney.

3.2.3 Arcadia

As mentioned previously, Arcadia was formerly known as Little Dural and then became known as Galston Heights in 1886. The name of Arcadia was adopted in 1894 when the public school opened. It was named by G. Shearston a British Naval Officer, after a mountainous region in the Greek Peloponnese which the ancient Greeks associated with an ideal rural life (Powell, 1994; Geelan, 1986). Arcadia has a distinct low scale rural character and its focus revolves around the Community precinct, comprising the Arcadia Public School, St Columb's Anglican Church and the Community Hall, dating from 1886, 1907 and 1934 respectively. These buildings and their settings epitomise the simple rural character and lifestyle of the area and are protected as heritage items under the Hornsby Shire LEP. The St Columb's Anglican Church at Arcadia, built in 1907 is one of the earliest surviving churches in the Study area.

3.2.4 Glenorie

Glenorie was officially named on 1st October 1894 after previously being known as North Dural. Orchards were planted in Glenorie in the 1860's, as was the case in many of the rural land townships. Today the land uses comprise mixed agriculture with a predominance of stone fruit orchards. The village area of Glenorie (eastside) was subdivided into residential size allotments ($700m^2$) in 1976-77.

The Memorial Hall, War Memorial Precinct, former Church and a number of houses, have been identified as heritage items in Glenorie and are protected under the Hornsby Shire LEP.

3.2.5 Maroota

It has been suggested that the word Maroota was taken from the Aboriginal word "maroo" meaning "good" and "ta" meaning "not" (Ollif, 1973), however this is not widely acknowledged. This could have been due to the rough terrain and poor quality soils in the area. Regardless of this, the land has continually been used for agriculture, including the growing of most kinds of fruits and vegetables. Despite the rough terrain, the Maroota area is rich in its Aboriginal heritage, and a number of the sites are regarded as some of the best in the State, including the previously mentioned Devil's Rock site.

The actual location of the Maroota township has been subject to confusion over the years. Originally it was located where the roads from Sackville and Pitt Town converge on their way to Wisemans Ferry, outside the Shire. The Maroota Government Village, however, was set up in 1932 for retired army veterans at the present location of Forest Glen, just south of Marramarra Creek (Schofield, 1988).

The present day Maroota is identified by the Maroota Public School, which is located within Baulkham Hills Shire. The Maroota area is now also recognised for its sand resource and extractive industries.

3.2.6 Wisemans Ferry

Wisemans Ferry, originally known as Lower Portland Head was one of the first villages to be developed in the Study area. The first grant was made to Solomon Wiseman in 1817, a hard working emancipated convict, who controlled the entire promontory for many years. Four other early land grants were made downstream of Wisemans Ferry, east of Singleton Road and two upstream utilising the alluvial flats.

Solomon Wiseman established an Inn and gained official permission to operate a Ferry across the River in 1827. The first Inn was called "The Sign of the Packet", however it closed after the licence expired. When the Great North Road was marked to pass through Wiseman's property, he successfully applied to open a hotel in his home known as "Cobham Hall". Subsequent additions were made to the original building which is now

known as the Wisemans Ferry Inn. The whole site, including the original gates and stone walls, have been included as heritage items under the Hornsby Shire LEP.

During 1826-1832, approximately 500 convicts camped on the hill above Wisemans Ferry during the construction of the Great North Road. Recently, a well or "soak" with a semicircular sandstone surrounding wall has been discovered approximately 1km south of the village, adjacent to Wiseman's original ferry crossing in 1827. It is suspected that this well provided fresh water for the convicts and stock encampment, as the river water at Wisemans Ferry is usually saline.

This well has not been identified in the Heritage Study and is therefore not included on the heritage schedule of the Hornsby Shire LEP. It is recommended that the site be included for its rare historic, scientific, social and aesthetic value.

By the 1880's, Wisemans Ferry accommodated a school, church and post office. The land was still largely used for grazing animals and orcharding and the housing was concentrated in a ribbon development along the higher land. By 1920, the number of orchards had decreased and a racecourse had been established. In 1930 the population of Wisemans reached 39 with services including a store, bakery, butchers and newsagent. However, the township served a population from a wider area, as it does today.

Probably the first indication that the area was seen as a leisure and recreational destination was the construction of nine "weekenders" by a Mr Nagle and his friends in the early twentieth century. The dwellings are now in the ownership of descendants of the original nine (Robert Moore & Associates).

Since the Second World War, Wisemans Ferry has predominantly been utilised for tourism and recreation. Land where orchards were once located, now accommodates services for water skiers and tourists, including a Country Retreat Hotel and golf course.

Wisemans Ferry continues to experience development pressures from recreational and tourist related activities which could substantially change the character of the village. To maintain the character of the village, appropriate strategies should be introduced by both Baulkham Hills and Hornsby Councils.

3.2.7 Laughtondale

There are two differing sources of information relating to the settlement of Laughtondale. Ollif suggests in "There must be a River", that the township was named after George Laughton, an early settler whose son John worked on the river boats. In Schofields "The Shaping of Hornsby Shire", it is suggested that Laughtondale was named after John Laughton who entered the colony in 1835 after absconding from a brig on which he was a carpenter. Following settlement on the Hawkesbury he became a boat builder, a trader, a storekeeper and orchardist. Nevertheless, the Laughton family name was adopted for the township and a number of descendants still live in the area today. Shipbuilding was continued by at least three generations of the Laughton family (Schofield, 1988; Hornsby Shire Historical Society, 1991). Archaeological evidence of the former shipbuilding activities is likely to be present as minimal building work has occurred on the land.

3.2.8 Singleton's Mill

Singleton's Mill is named after James Singleton, who in the early 1820's established a tidal flour mill on the meander of the Hawkesbury River, north of Foul Weather Reach. The production of wheat was an important industry in the colony at this time and Singleton took advantage of the location on the Hawkesbury, being the major transport route between Windsor and the Sydney markets. The Mill was a prominent landmark along the Hawkesbury and was the subject of one of George Collingridge's artworks (Schofield, 1988). The Mill was demolished in the 1900's, however grooves can still be seen in the waterside rock where the Mill was originally located. This site is an important industrial archaeological site and is protected under the Hornsby Shire LEP as a heritage item.

3.2.9 Fiddletown

As the rural area developed, parts of larger areas were given separate names. In the late 1890's, three men, William Small, and Horace and Fred Henstock obtained land in the area of Upper Galston. It is understood that the men spent one night a week on the property to comply with the residential conditions in place at the time. The three men learnt to play violin from Chris Willings, a violin teacher in Galston. As a result, Frank Waddell of Arcadia referred to the area as the "fiddle town". The area has been known as Fiddletown ever since (Schofield, 1988 and Ollif,

1973). There are no known European heritage items in the area of Fiddletown.

3.2.10 Berrilee

As noted, Berrilee is believed to have been derived from the Aboriginal words "Birra Birra" meaning sow and piglets. Berrilee was known as the smallest and most remote settlements in the Parish of North Colah, located along the road to Berowra Waters. The land was used for orchards and animal farming (Schofield, 1988). Access to Berrilee was improved with the operation of the Berowra Waters ferry at the beginning of the twentieth century. Today agricultural uses still predominate in the area of Berrilee, revolving largely around animal husbandry.'

3.2.11 Forest Glen

Forest Glen originated as a travellers half way house on Old Northern Road, between the Bests Inn at Middle Dural and Wisemans Inn at Wisemans Ferry. In 1982, the Government set up a village for retired soldiers, however it failed due to the poor soils in the area. The name is self explanatory being located in the middle of a dense forest (Ollif, 1973).

3.2.12 Canoclands

Canoclands Ridge extends from Old Northern Road, eastwards, north of Marra Creek and Forest Glen. It is said to be an area where Aboriginal people obtained bark for building canoes and the area is best known for the well preserved Aboriginal rock carvings in the area (Powell, 1994, Ollif, 1973).

3.3 Heritage Management

In 1992-93, Hornsby Shire Council undertook a Heritage Study of the Shire which was jointly funded by Council and a grant from the Federal Government under the National Estate Program. The Heritage Study identified approximately 850 items of European heritage significance, ranging from grand federation mansions to modest workers cottages, gardens, street trees, archaeological sites, and churches. One of the recommendations of the heritage study was to include the items within a Local Environmental Plan (LEP) to provide for their management and protection. The Hornsby Shire LEP fulfilled this recommendation by including a schedule of heritage items and heritage conservation areas combined with provisions for the protection and management of the heritage resources.

Under the Hornsby Shire LEP, the management of the heritage resources in the rural land area is generally the responsibility of Hornsby Council although in some instances, the NSW Heritage Council and the NSW National Parks and Wildlife Service are also involved.

Supplementary to the Hornsby Shire LEP, Council has produced a Heritage Development Control Plan (DCP) which provides both technical and administrative advice to owners of heritage items and properties within heritage conservation areas. The DCP applies to the whole of the Shire and includes specific guidelines for development relating to streetscape, design, siting, fences and gates and landscaping. In addition, the Rural Lands (Interim) DCP includes provisions relating to heritage issues specific to the rural area.

3.3.1 Heritage resources

Heritage resources within the area comprise both Aboriginal Heritage and European Heritage.

Aboriginal Heritage

As already noted, the study area has a rich heritage dating back to Aboriginal occupation and the early days of European settlement. There are numerous Aboriginal sites within the study area, consisting of engravings, grinding grooves, paintings, shelters and habitation deposits. In the past, Aboriginal sites have been unknowingly destroyed and threatened by development because their existence and significance was unknown. In addition, some Aboriginal sites may have special ceremonial or spiritual significance and should not be visited by men, women or non-initiated persons. Consequently, the management of sites is a complex and difficult issue.

The National Parks and Wildlife Service is responsible for protecting and managing Aboriginal relics and sites, however it does not have a comprehensive register of all sites within New South Wales.

Under the National Parks and Wildlife Act, 1974 anyone who discovers an Aboriginal site has the legal obligation to notify the National Parks and Wildlife Service. However, there is a need to comprehensively identify Aboriginal sites to ensure adequate protection and management in the future. In this regard, Hornsby Council is currently undertaking an Aboriginal Heritage Study for the whole of the Shire, excluding

National Parks, concentrating on areas which are currently under development pressure. The study is being undertaken in consultation with the National Parks and Wildlife Service and the Metropolitan Aboriginal Land Council, and will assist in the identification of sensitive sites and enable appropriate management procedures prior to any disturbance. It is anticipated that the study will be completed by the end of 1995 and make the following recommendations:

- * identify and promote sites available for public access;
- * ensure that sites are adequately protected by fencing or other means;
- * ensure that sites are appropriately conserved;
- * deny public access to sites where they have special spiritual significance or are sensitive to the impacts of visitation;
- * ensure that all sites are adequately mapped and included on Council's computer system to minimise future damage or disturbance of sites;
- * require site surveys as part of the development application process where areas have been identified as having a high possibility of containing Aboriginal sites.

Currently under the Hornsby Shire LEP, consent is required if an archaeological site or relic of Aboriginal significance is proposed to be disturbed. Any proposal must also be referred to the National Parks and Wildlife Service for its comment.

Crown land within the study area is subject to a number of Aboriginal land claims on the basis of historic and cultural ties with the land. The determination of the land claims are the responsibility of the Department of Land and Water Conservation which will determine ownership of the land.

European Heritage

European heritage items consist of buildings and other structures, archaeological sites and landscape items. The Heritage Schedule of the Hornsby Shire LEP (Schedule D) lists 90 heritage items within the study area (Appendix D). The items consist of 39 houses, 16 churches, cemeteries and community buildings, 12 windbreaks, street trees and gardens, 5 parks and bushland reserves, 7 ruins and archaeological sites, 7 items associated with road works and 4 commercial buildings.

The Schedule however, is not intended to be a comprehensive list and it is expected to change over time as new items are identified and others are removed. In this regard Council will need to update and review the schedule on a regular basis. This study does not intend to review the Heritage Schedule as this will be undertaken in Council's Heritage Review currently underway and expected for completion in 1996.

The Schedule indicates whether the item is significant at the local, regional or state level. Items of state or regional significance within the study area include St Judes Church, Fagan Park, Waddell Cottage, Old Northern Road south of Wisemans Ferry, Wiseman's Ferry Inn, Wisemans Ferry cemetery, Singletons Mill, Berowra Valley Bushland Park and Marramarra National Park. The Old Northern Road and Wisemans Ferry Inn are the oldest surviving European heritage items dating from 1826-32 and 1826, respectively. The remains of the footings from Singletons Mill date from 1818.

Development consent from Council is usually required under the Hornsby Shire LEP, before any development can occur on a property containing a heritage item. If the proposal is minor and/or will not adversely affect the heritage significance of the item, Council has the discretion not to require development consent. In these cases, however, building consent is usually still required.

Where an archaeological site of European significance is proposed to be disturbed, an excavation permit must also be obtained from the NSW Heritage Council, in addition to Council consent.

The Heritage Review currently underway will examine the relevance of the heritage provisions to the rural area and ensure the continued, appropriate management of heritage within the Shire.

3.3.2 Heritage Threats

The main threat to European heritage items in the rural area is demolition. This is largely as a result of two main issues, namely the desire of property owners to build new larger dwellings on the same property as heritage items and the desire to use heritage buildings for commercial/business uses.

Over a third of the heritage items in the study area are Federation farm houses or workers cottages of timber construction and modest proportions. These homes are often located on

large allotments of land. The conservation of these dwellings comes under pressure when the dwelling no longer meets the requirements of the owner and extensive renovation or replacement is considered.

The current planning provisions relevant to the Rural A and B zones do not allow for the erection of a second detached dwelling. Additionally, properties have usually been subdivided to the minimum allotment size of 10 or 2 hectares, in the Rural A and B zones, respectively and do not provide for further subdivision.

In many cases, second dwellings could be accommodated on the large allotments without adversely affecting the heritage significance or setting of the building. This is particularly the case where the existing heritage items are located close to the road and the new dwelling is proposed to be set well back on the property. Additionally, due to the small number of items in the area, it would have a limited impact on the existing infrastructure. Recent cases have indicated that owners are willing to keep the heritage items if a new dwelling on the property is permissible, therefore reducing the threat of demolition.

Within the Rural A and B zones, permissible uses are largely limited to residential, agricultural and community uses and do not provide for business and retail uses such as guest accommodation and business/retail outlets, including art studios/galleries, antique shops, coffee shops and florists. Home occupations and home industries are permissible in these zones, however they are restricted in terms of the area of floorspace, the employment of additional staff and the selling of items from the premises. Furthermore, the owners of the property must reside in the premises for this type of use to occur.

Consideration should be given to the use of heritage buildings for other compatible commercial and business uses would generally not adversely affect the heritage significance of the buildings and in many cases, it would provide for the ongoing use and retention of the buildings. Careful consideration however needs to be given to the proposed use, in relation to the location and significance of the building.

3.4 Heritage Resources Conclusions

The rural area is rich in both Aboriginal and European heritage resources and is now characterised by modest townships and villages

whose existence arose and still relies largely on transportation networks and the agricultural productivity of the land. There is much interest in the heritage of the rural land area as it contributes to the visual environment and the rural character of the area.

The Aboriginal resources are constantly under threat of destruction as many sites are unknown or have not been accurately mapped to ensure their protection from development or recreational activities.

In addition, a number of European heritage items have more recently come under the threat of demolition due to rural/residential development, the introduction on non-rural based uses and the changing needs of the residents in the area. In particular, many new large houses are being built in the area making the small heritage cottages a less attractive housing option. As second dwellings are not permissible on allotments, these buildings are also becoming subject to the threat of demolition.

In many cases, owners are willing to retain heritage items, however are requesting alternative uses to pursue business and retail endeavours in the buildings. At present, these requests have not been allowed due to existing planning controls and Council needs to consider this as an option to provide for the retention of heritage resources in the area.

CHAPTER FOUR - NATURAL ENVIRONMENT

The natural environment forms a dominant feature of the Study area and is well preserved through the reservation of National Parks, bushland reserves and other undisturbed areas. The natural environment provides both opportunities and constraints for future development within the Study area. Prior to the preparation of a planning strategy, consideration needs to be given to the capability of the land and factors which may limit or restrict development. Factors which need to be considered in environmental management include geology, topography, drainage, water quality, soils, flora, fauna, bush fire hazard, air quality and climatic change.

4.1 Geology

The underlying geology of the region has determined other elements of the natural environment such as topography, drainage patterns, soil type, slope stability and flora communities. Geology also influences extractive resources and has implications on engineering and construction works including footing depth and stability of excavations.

4.1.1 Geological Units

The dominant geological unit of the area is Hawkesbury Sandstone, which is evident throughout the Study area in the form of steep cliffs, benches and boulders (see figure 4.1). The unit comprises quartz sandstone with minor shale lenses. The sandstone is dominantly medium to coarse grained, although varies from fine to very coarse grained (Herbert, 1983). The soil that is derived from the sandstone is sandy and infertile, although the native indigenous vegetation has adapted to this infertility.

The Ashfield Shale formation of the Wianamatta group overlies the Hawkesbury Sandstone. The deposit is evident within the southern part of the Study area, along the ridges between Cherrybrook, Glenorie and Fiddletown, in isolated outcrops along Old Northern Road and at Canoelands (see figure 4.1). The Ashfield Shale is black to dark grey in colour and is moderately fertile. Fertility is evident in the establishment of orchards and market gardens in these areas, as opposed to the less fertile Hawkesbury Sandstone.

The Garie Formation of the Narrabeen group underlies the Hawkesbury Sandstone and outcrops

along the lower valley slopes, adjacent to the Hawkesbury River (see figure 4.1). The Garie Formation consists of interbedded massive sandstone, laminated shale and massive claystone (Herbert, 1983).

At Maroota, a Tertiary sand deposit, known as the Maroota Sand, outcrops above the Hawkesbury Sandstone (see figure 4.1). The Maroota Sand was deposited by an ancient stream which flowed across the Hawkesbury Sandstone. The majority of the deposit has been eroded, leaving the Maroota Sand as a remnant deposit with an estimated total size of 41 million tonnes (Resource Planning, 1991). The deposit has a maximum thickness of 39m at the Maroota Trig and generally consists of sand sized material. However, the particle size of the material varies between sand and gravel, pebbly sand, clayey sand and clay. Clay/shale lenses form an impermeable layer within the deposit and create perched water tables.

The floodplain of the Hawkesbury River has been created through the deposition of sediments. The sediment consists of sand, gravel and clays, which has originated elsewhere in the catchment and transported to the current sites by the River. The sediment is collectively referred to as alluvium, which overlies the other geological units along the River. The movement of sediment is a natural process, although land use practices have increased erosion and regulated the flow of the River, creating a different pattern of erosion and deposition.

A number of small isolated volcanic breccia deposits occur within the Study area, such as those along Georges Creek on the southern boundary of the Study area.

4.1.2 Extractive Resources

The geological units are able to be quarried and mined forming a variety of extractive units. The Maroota Sand deposit has been identified as an extractive sand resource of regional significance which has been recognised by Sydney Regional Environmental Plan (SREP) No. 9 - Extractive Industries. SREP No. 9 permits extraction of the deposit, provided consent is obtained, and restricts the establishment of other land uses in the area which may sterilise the resource. In 1991, it was estimated that 27 million tonnes of the deposit had been either proposed to be extracted or secured by potential operators for extraction (Resource Planning, 1991).

In the Maroota area, the Hawkesbury Sandstone is more friable due to weathering and is also extracted and sold. It is estimated that 40 million tonnes of friable Hawkesbury Sandstone is available for extraction (Resource Planning 1991). The friable sandstone does not have the clay content of the Maroota Sand and does not require washing to remove these fine particles. An amendment to SREP No. 9 in 1995 recognised the importance of the friable sandstone as an extractive resource, as well as the Maroota Sand.

Shale lenses outcrop within the Maroota Sand deposit at Maroota and within the Hawkesbury Sandstone around Canoelands Road and at other isolated locations. The shale is generally white-firing and is used in brick making. The overlying sandstone is also quarried and sold from these sites. Two mining leases have been issued for clay and shale extraction, one in Marra Avenue, Canoelands, and the other adjacent to Old Northern Road, Forest Glen. A number of unauthorised extractive operations have also operated over the last two decades.

The Hawkesbury Sandstone is also a source of flagging stone and bush rock. Flagging stone extraction sites have also established in isolated locations within the rural area, often without permission. Flagging stone resources are confined to cross-bedded units within the Hawkesbury Sandstone, which are of limited occurrence and extent (Department of Environment and Planning, 1984). Bush rock consists of sandstone rocks and floaters lying on the ground surface which are removed and sold for landscaping. The removal of bush rock is classified as an extractive industry and requires Council permission. Surface sandstone is an important habitat and shelter for some fauna species, including the endangered Broad-headed Snake. The removal of the rock displaces these species.

Loam (soil) resources have been identified as occurring within the valleys of the small creeks which flow into the Hawkesbury River, downstream of Wisemans Ferry, including Laughtondale Gully, Dalgetys Creek and Laybury Creek. Loam is a friable, fertile mixture of sand, silt and clay in relatively equal proportions and generally contains some organic matter. Extracted loam is used as a growing medium for plants in gardens, parks, landscaped areas and nurseries (Department of Environment and Planning, 1984).

The Department of Mineral Resources, have indicated in a submission to this Study, that the volcanic breccia deposits can be used as a source of roadbase, however the deposits are considered to have little potential for extraction because of their small size and/or the environmental implications of extraction.

4.1.3 Resource Management

All extractive industries require Council consent and large operations are classified as designated developments, requiring the preparation of an Environmental Impact Statement. Hornsby Council has prepared a Development Control Plan in conjunction with Baulkham Hills Council, to guide extraction at Maroota. Ministerial Direction G28 requires Council to consult with the Department of Mineral Resources if a provision of a Draft LEP is likely to prohibit the extraction of, or sterilise deposits of coal, minerals, petroleum or extractive materials. The Department was contacted during the course of this Study and they advised:

"With respect to coal and petroleum resources within the Study area it is advised that the area overlies the Illawarra Coal Measures which occur at depths in excess of 700 metres and are thought to contain medium rank coking coal. The potential coal resources in this area are unlikely to be of interest in the short to medium term. However there is good potential for the development of coal seam methane resources within the area which would have good development potential in the short to medium term. The proximity to Sydney and the Sydney-Newcastle Gas Pipeline heighten the development potential of any resources within the area. There may also be potential for conventional petroleum resources, although exploration aimed at this is lacking."

It is to be noted that access to land for exploration within the Sydney region is scarce and continually being reduced by further urban development. The Department would oppose any rezoning or reclassification of land within the Study area that would further restrict exploration for coal seam methane or conventional petroleum. This is particularly important in areas adjacent to, or surrounded by, National Parks and Nature Reserves.

The major non-coal mineral resources within the area are the Maroota Tertiary sand and

friable sandstone deposits which occur on the north-western margin of the Study area. Council would be aware of the extent and nature of these resources which are described in detail in the management Study which was jointly commissioned by Hornsby Council, Baulkham Hills Shire Council and the Department of Planning. This Department recommends that land use zonings within these deposits, as identified in the management plan, should be consistent with the recommendations of the management plan.

With the exception of the Maroota deposits, there are few other construction material resources with any significant potential and most of these are not considered to require any specific protective zoning or planning controls. However extractive industry should remain a permissible use, with Council consent, in areas where Rural A or Rural B zonings are to be retained.

The land within the clay/shale leases should be zoned to permit extraction and zoning to permit rural residential subdivision or other forms of development incompatible with extraction should not be introduced over adjacent lands until extraction has been completed. Similar deposits are known to occur at a number of other locations within the Study area, particularly in the vicinity of Canoelands. However, the potential for extraction from these deposits, outside the existing extraction sites, appears to be limited due to environmental and land use constraints, and the existing zoning, which precludes extraction.

Flagging stone has been extracted from a small quarry close to the southern boundary of Marramarra National Park. The current status of this quarry is not known but there has been no recorded production in recent years. If there is further potential for extraction the site should be zoned to permit extraction.

Most of the Study area is underlain by sandstone of the Hawkesbury Sandstone which has potential for the production of roadbase, flagging stone, and possibly dimension stone. However, with the exception of the abovementioned flagging stone quarry, no specific areas with potential for the extraction of any of these commodities have been identified.

Deposits of loam occur in levees along the Hawkesbury River and in tributary valleys and extraction has taken place at a number of sites in the past. While there may be some further potential for extraction it appears to be generally limited and no specific planning measures are considered necessary to protect these resources."

The Department of Mineral Resources' comments indicate their concern about the sterilisation of extractable resources, through planning controls permitting incompatible land used or prohibiting extractive industries and mines. The Department's concerns need to be considered as part of the development of future planning controls for the area.

4.1.4 Development Issues

As well as being a source of extractive materials, the geology of the area influences other land use activities. In terms of agricultural uses, the geology influences whether the soil is suitable for cultivation and grazing, as detailed in Section 4.4.2.

In terms of building and construction activities, all of the geological units provide a suitable base for foundations. The depth of footings in Hawkesbury Sandstone is generally only required to be shallow due to the shallow soils, whereas the deeper soil profile associated with shales requires deeper footings to reach base rock. Similarly, cuttings and excavations in Hawkesbury Sandstone can be steep, due to the stable nature of the rock. However, excavations in shales are more prone to mass movement and excavations occur at a more gentle slope.

4.2 Topography

The topography of the area has resulted from the erosion of the underlying geology. The topography associated with the remnant Wianamatta Group of shales around Galston and Dural consists of undulating to rolling hills with a local relief of 50-80m and slopes of 0-20% (figure 4.2). Conversely the erosion of the Hawkesbury Sandstone has formed steep sided hills and valleys along the drainage lines. Local relief varies from 40 to 200m, with slopes ranging from 25 to 70% and rock outcrops having slopes from 50% to vertical. The most dramatic example of the steep topography is at Wisemans Ferry where the hillsides rise to 200m above the Hawkesbury River. The floodplains along the Hawkesbury

River near of Wisemans Ferry are level to gently sloping (0-5%) and have local relief of less than 5m.

The Hawkesbury River and Berowra Creek are described as drowned river valleys. The present form of the valleys was formed in the Holocene Period, some 10,000 years ago, when sea level rise drowned the lower slopes of the steep "v" shaped sandstone valleys (Herbert, 1993, Chapman et al, 1982).

Steep slopes are a significant constraint to rural and urban development. Lands with slopes in excess of 20% are generally considered to be not suitable for agricultural, rural or residential development, due to engineering difficulties, site stability and erosion problems. In 1985, LEP No. 10 introduced the Environmental Protection zoning to lands which were not considered suitable for development due to their steep bush covered slopes, scenic value and high soil erosion hazard.

As part of this Study, a comparison of the Environmental Protection B (River Catchment) boundary and the slope analysis maps has been undertaken. The comparison revealed that the zone boundary generally coincides with the 20% slope classification, however in some areas the boundary is inappropriately located as lands flatter than 20% are zoned Environmental Protection B (River Catchment), whilst in other areas lands exceeding 20% are zoned for rural purposes. To protect sensitive areas from development and to better reflect land capability, the boundary of the Environmental Protection B (River Catchment) should be reviewed.

Under the Soil Conservation Act, 1938, the Soil Conservation Service have classified steep land (greater than 33% slope) within the study area as "Protected Land". The boundaries of the Protected Lands generally coincide with lands zoned Environmental Protection B (River Catchment) under the Hornsby Shire Local Environmental Plan. The consent of both the Soil Conservation Service and Hornsby Council is required prior to clearing activities within Protected Lands.

Steep slopes also influence construction techniques. In areas with steep slopes it is not appropriate to erect dwellings on concrete slabs which require considerable cut and fill and may cause soil erosion and create a visual scar. Construction techniques such as pole or split level dwellings are more appropriate as they retain the

natural form of the hillside and cut and fill is minimised. It would be appropriate for a development control plan to contain design guidelines and development assessment criteria for the construction of dwellings and to ensure the topography and its limitations are considered in the assessment of proposals along with limitations on cut and fill.

4.3 Drainage

Rain which falls onto the ground either infiltrates into the soil or flows along the ground surface to watercourses. The proportion of the rain that drains along the ground surface is known as runoff. The volume of runoff is influenced by the intensity and duration of the rain event, soil type, ground cover and catchment area.

The flow of runoff is an important consideration in the assessment of the natural environment. This section will consider runoff and catchment areas, groundwater and floods within the Study area. The following section will consider drainage in the context of water quality.

4.3.1 Runoff and catchment areas

The Study area covers an area of 306 km² and is located within the catchment of the Hawkesbury River. The northern third of the Study area drains directly into the eastward flowing Hawkesbury River via a number of small creeks, including Cooper Creek, Layburys Creek, Dalgetys Creek and Ashdale Creek (refer figure 4.3). The southern two-thirds of the Study area drains into Berowra Creek, a major tributary of the Hawkesbury River. Berowra Creek flows in a northerly direction with its western catchment boundary being Old Northern Road. The eastern and southern portion of the Berowra Creek catchment is outside the Study area. There are two main tributaries of Berowra Creek, namely Marramarra - Colah Creek and Berowra Creek downstream of Marramarra Creek. Other tributaries of Berowra Creek within the Study area include, Coba Creek, Calabash Creek, Halls Creek, Tunks Creek, Georges Creek (refer figure 4.3). These creeks and watercourses have incised channels through the sandstone and shales forming the characteristic steep sided valleys.

Under the Soil Conservation Act, 1938, the Soil Conservation Service has listed the Hawkesbury River, Berowra Creek and Marramarra Creek as "prescribed streams". The consent of the Soil Conservation Service is required to be obtained

prior to the destruction of any tree or shrub growing within 20m of the watercourse.

The flow of runoff to watercourses or within watercourses can be interrupted by dams and other structures. Within the Study area there are numerous farm dams which have been constructed to provide water for agricultural and domestic use. These dams intercept and collect the runoff. During low intensity and short duration rain events, runoff may be entirely collected within dams and not reach watercourses. However, during more intense and longer rain events, the dams may overflow which allows the runoff to continue downstream.

The collection of runoff by dams can have an adverse effect on downstream water quality, as the runoff volume is insufficient to flush pollutants through the system. However, dams may also have a positive effect on pollution as they can act as both sediment traps, nutrient filters and detention systems. Sediment and the attached nutrients being transported by runoff is trapped in the dam and settle out of suspension. The growth of aquatic plants in dams also assist to improve water quality as the plants are able to use the nutrients for their growth. Consequently, there needs to be a balance in the management of runoff between the storage and flow of water.

Catchments also represent a natural unit for land resource management. Activities within one part of the catchment can have an impact upon another part of the catchment. For example, pollution in the upstream areas of Berowra Creek, such as Cherrybrook, impacts on the water quality at Berowra Waters and within the Hawkesbury River. The decreased water quality can impact upon aquatic flora and fauna, tourism, recreation and the fishing and oyster industries.

The philosophy of Total Catchment Management involves the co-ordinated use and management of land, water, vegetation, other physical resources and activities within a catchment, to ensure minimal degradation and erosion of soils and minimal impact on water yield and quality and on other features of the environment (Cunningham, 1986). Through the appropriate and co-ordinated management of the land within a catchment, the environmental qualities of the catchment can be maintained.

To assist the Total Catchment Management process within the Hawkesbury Nepean basin the Hawkesbury Nepean Catchment Management Trust has been established. The Trust has formed

the Berowra Catchment Management Committee to overview activities within the Berowra Creek Catchment. The Public Works Department has also established the Berowra Creek Estuary Management Committee to overview activities within the Berowra Creek estuary.

4.3.2 Groundwater

That portion of rainfall which infiltrates into the soil becomes part of the groundwater. Groundwater is often used as a source of water for agricultural and some domestic uses. In a submission to this Study, the Department of Water Resources advised that the Hawkesbury Sandstone, Wianamatta Group of shales and Narrabeen Group have low permeability, yielding small volumes of groundwater, generally in the range of 0.1 to 0.9 litres per second from bores. The Department also advised that there are some 25 registered bores within the Study area.

At Maroota, two types of groundwater systems exist, being the perched water tables and a more extensive groundwater resource associated with the Maroota Sand deposit. Perched water tables are associated with localised impermeable clay/shale layers in the friable Hawkesbury Sandstone. The major groundwater storage is located within the Maroota Sand deposit and the associated buried river channel. It is estimated that the total volume of groundwater storage for the main aquifer is likely to be in excess of 8,000 Mega Litres (ML), with an annual recharge volume of 3,000ML (Resource Planning, 1991).

Water from both the perched water table and groundwater resources is utilised for agricultural production. The water reaches the ground surface via natural springs or bores and is collected in dams. There are eight registered bores at Maroota, of which at least two are used for agricultural purposes (Resource Planning, 1991).

There has been some debate over the impact that the sand extraction at Maroota is having and will have on the groundwater resources. As well as being used for agriculture production, the water flows naturally from springs which are important to the viability of downstream ecosystems, such as wetlands. The vitality and longevity of the ecosystem is dependent on base flows associated with groundwater discharges. To protect the groundwater supplies, a limit to extraction of the 180m AHD level was adopted by Hornsby Council, based on a recommendation of the Maroota Management Plan (Resource Management 1991).

Groundwater also has the potential to be polluted by chemicals leaching through the soil. All opportunities to collect and to reuse or treat polluted water are to be encouraged, and thereby minimise the infiltration of pollutants into the soil and groundwater.

4.3.3 Floods

Land adjacent the Hawkesbury River and Berowra Creek is prone to flooding following prolonged heavy rainfall within the respective catchments. The alluvial flats downstream of Wisemans Ferry constitute a floodplain which are inundated from time to time. There is no accurate information as to the frequency of flooding at Wisemans Ferry. Information from Windsor indicates that 110 flood events had occurred between 1809 and 1984 (Mitchell McCotter & Associates, 1984). However this data cannot be extrapolated to provide a flood frequency at Wisemans Ferry as the River height is determined by flood events from the Hawkesbury-Nepean, Colo or McDonald Rivers. The highest recorded flood level at Wisemans Ferry is 5.8m which occurred in June 1867.

In the 1980's, the Public Works Department recommended that Hornsby Council recognise the 1 in 100 year Average Recurrence Interval (ARI) flood level of 6m between Wisemans Ferry and Gentlemans Halt. This level was incorporated into the planning controls of the Hornsby Shire Planning Scheme Ordinance in 1985. Based on this level, a total of 71 properties would be potentially affected by flooding, of which nine properties would be totally inundated.

The extent and nature of flooding downstream of Wisemans Ferry is currently being reviewed as part of the Hawkesbury Floodplain Management Study, which is being funded by the Public Works Department. The results of the Study are not yet available, although it is likely that the Study will have implications for flood liable lands along the Hawkesbury River including a recommendation for amendments to the flood line shown on the zoning maps.

Information concerning flooding in Berowra Creek is limited. Major floods were recorded in 1893 and 1942 (Joffe, 1992, Hornsby Shire Council, 1993). Floods within Berowra Creek do not inundate large areas of land as the valley sides are steep and are therefore less prone to flooding. However, flood debris, consisting of logs and rubbish, downstream do cause problems by

polluting the watercourse and damaging boats (Hornsby Shire Council, 1993).

"The Floodplain Development Manual" (Public Works Department, 1986) recommends that to mitigate against the threat and damage caused by floods, structural and non-structural measures can be used. Structural measures are designed to reduce the incidence or impact of flooding on developed areas by modifying flood behaviour, for example levees, flood mitigation dams, by-pass floodways, channel improvements and retarding basins. Non-structural measures are intended to reduce susceptibility of new development to damage and disruption from floods and reduce the impact of flooding on existing development; for example, land use zoning, building and development control, flood insurance, voluntary purchase, public information and education, flood forecasting, warning and evacuation planning (Public Works Department, 1986).

As Hornsby Shire is located within the lower reaches of the Hawkesbury River, there is little opportunity to control the large volume of flood waters from upstream areas with structural measures, accordingly, non-structural measures are more appropriate. Land that is subject to flooding is zoned Open Space A (Public Recreation - Local), Environmental Protection A (Wetland), Environmental Protection B (River Catchment), Environmental Protection C (Tourism) and Environmental Protection D (Recreation). These zones limit the type and nature of development, and do not encourage housing or commercial activities. Ministerial Direction G25 - Flood liable land, directs Councils not to rezone flood liable land to a residential business or industrial zone or introduce provisions to increase development on flood liable land without the approval of the Director of the Department of Urban Affairs and Planning.

Under the HSLEP all development proposals, including dwellings, between the floodline and the Mean High Water Mark (MHWM) require development consent. In any development of these lands, the HSLEP requires that the floor level of habitable rooms be at an elevation of at least 6m AHD.

It would be appropriate that the existing controls be reviewed upon completion of the Public Works Department's Hawkesbury Floodplain Management Study.

4.4 Water Quality

Many of the activities within the rural area have caused the deterioration of the water quality of small watercourses, Berowra Creek and the Hawkesbury River. Poor water quality can contribute to a range of problems including poor visual quality of the waterway, offensive odours, the death of native plants and animals, introduction of weeds, health risks, algae blooms, reduced recreation capacity, potential loss in profitability to business, tourism and aquaculture.

Water quality is primarily determined by land and water based developments. Pollution from development will initially impact upon the immediate watercourses and then with time be transported downstream to the estuaries of Berowra Creek and the Hawkesbury River. The analysis of water quality provides a useful indication of the health of the waterbody and a means to assess measurable impacts of different land uses. For example, does water quality deteriorate as land use within a catchment change from natural to rural to urban. This section will examine water quality parameters, the existing water quality, sources of pollution and improvements.

4.4.1 Water Quality Parameters and Standards

As part of Hornsby Council's water quality monitoring program the following physical, chemical and biological parameters are measured for fresh water aquatic systems. The parameters are tested against standards which have been derived from the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, 1992). As recommended by the guidelines, it is proposed that following the collection of sufficient baseline data from natural or reference catchments, these standards will be modified for local conditions.

pH

pH is a measure of the acidity of water and is recorded in logarithmic scale from 1 to 14, with 1 being highly acidic, 14 highly alkaline and 7 being neutral. The ANZECCs guidelines recommend that a standard of between 6.5 and 9.0 be adopted for pH. A pH range of between 5.0 and 9.0 is generally not lethal to fish, however, the toxicity of some pollutants (eg ammonia and cyanide) can be markedly affected by pH changes in this range (ANZECC, 1992). A more acidic water quality (pH 4) can liberate

metals, such as Aluminium in to the watercourse, which can result in fish kills, as experienced in coastal rivers in northern NSW.

Temperature

Water temperature has a substantial effect on the functioning of aquatic ecosystems and the physiology of the biota (ANZECC, 1992). Generally, the temperature of a water body varies with the seasons. However, the temperature can be varied dramatically through the discharge of cold water from reservoirs and dams or the release of warm water from power stations. The temperature of the water body is measured for use in calculating the results of other parameters and to determine if thermal pollution is occurring. There is no adopted standard for temperature as it depends on the latitude of the locality and seasonal variations. Consequently, to establish a standard it is necessary to collect samples over a period of one or two years and then compare individual samples with seasonal means.

Conductivity

Conductivity is a measure of the ability of water to carry an electric current which depends on the concentration of ions in solution and their mobility. A conductivity of less than 1.5ms/cm is expected for freshwater, if not, the water may be contaminated by dissolved substances.

Dissolved oxygen

Dissolved oxygen is a measure of the oxygen levels available for respiration of aquatic fauna. The level is dependent upon temperature, light, salinity and the physical, chemical and biological activities in the water. The oxygen is produced through photosynthesis, while respiration by aquatic organisms removes oxygen from the water. The death of some sensitive fish species will occur if the dissolved oxygen levels fall below 6mg/L.

The analysis of dissolved oxygen is a key test for assessing water quality, however levels can vary throughout the day as a result of varying light and photosynthesis. Therefore sampling should occur over a period of days to account for variations.

Salinity

Salinity is a measure of the level of salts in a water body. Consequently, estuarine waters have a higher salinity than fresh water streams. In fresh waters, salinity should not exceed 1,000

mg/L, however, saline rock strata or pollution can increase the salinity of fresh water bodies. Salinity changes may affect aquatic organisms either through changes to chemical reactions such as photosynthesis, or by modifying the species composition of the waterbody (ANZECC, 1992). A saline waterbody is also not suitable for human consumption or irrigation.

Turbidity

Turbidity is a measure of the clarity of water which is measured by assessing the light scattering by suspended particles. Turbidity is caused by suspended matter, such as clay, silt, fine inorganic and organic matter and microscopic organisms. The level of turbidity affects the condition and productivity of the water body by interfering with the levels of available light. A reduction in light penetration will result in a reduction in photosynthesis and hence primary production, with possible deleterious effects on phytoplankton, macrophytes and benthic plants. A number of predatory fish and birds rely upon the clarity of water to see their prey, conversely other species of fish rely on less clear water to hide. In addition to influencing the optical properties of a waterbody, suspended particles may directly affect aquatic ecosystems by settling and smothering benthic organisms (ANZECC, 1992).

Non-filterable Residues (NFR)

Similar to turbidity, NFR is a measure of suspended solids (fine particles) within the water column. The level of NFR affects the clarity of the waterbody and sedimentation, as previously discussed under turbidity. As the volume of suspended solids is dependent upon the geology and soil type of the area (eg, sands, clays, silts or loams) the ANZECC standard is that the sample should have less than 10% variation from the seasonal mean. Under the Clean Waters Act a standard of 50mg/L has been adopted. Consequently, a longer sampling period is required to establish the seasonal means. In the interim the results of developed catchments should be compared with natural catchments of similar geology and soils.

Oxidised Nitrogen (NOX)

NOX is the most common biologically available form of nitrogen and usually makes up the greatest percentage of total nitrogen. Nitrogen is highly soluble in its oxidised state and is capable of being lost to the atmosphere through biological

action (Williams and Callaghan, 1991). NOX is significant as it is a contributor to algal blooms in estuaries. There is no adopted standard for NOX. Upon the collection of more baseline data, the level of NOX for the natural catchments will form the basis for the local standard.

Ammonia

Ammonia is a component of total nitrogen and is measured to enable the determination of the levels of organic nitrogen. Ammonia is also an indicator of sewage and bacterial decomposition. The recommended standard for ammonia is 0.02 - 0.03 mg/L, however the concentration of ammonia can vary depending on temperature and pH (ANZECC, 1992). High levels of ammonia can result in the death of freshwater organisms. Fish have been identified as being more sensitive to ammonia than invertebrates and aquatic plants.

Organic Nitrogen

The level of organic nitrogen can be calculated by subtracting the levels of NOX and ammonia from total nitrogen. Organic nitrogen is generally not available for biological activity.

Total Nitrogen

Total nitrogen is an indicator of the nutrient levels in a waterway. Total nitrogen is made up of oxidised nitrogen, ammonia and organic nitrogen. The adopted standard for fresh water is 0.1 - 0.75 mg/L. Elevated concentrations of the nutrient contribute to stimulating excessive growth of floating and attached algae (such as red algae) in the estuarine sections of Berowra Creek. The likely source of nutrients are from sewage treatment plants, septic discharge and runoff from urban and rural areas.

Total Phosphorus

Similar to total nitrogen, total phosphorus is an indicator of the nutrient levels in a waterway. The adopted standard for fresh water is 0.01 - 0.1 mg/L. Phosphorus stimulates plant growth which can result in increased plant biomass, such as blue-green algae and a restriction of water usage (Williams and Callaghan, 1991). Algal growth in fresh water is controlled by the phosphorous levels, temperature, clarity and water velocity. Sources of phosphorus include fertilizer used for agriculture and on residential lawns.

Chlorophyll-A

Chlorophyll-A is a major photosynthetic pigment of plants and has been widely used as a measure for estimating phytoplankton biomass and productivity. Chlorophyll-A is an indicator of blue-green algae. Eutrophic (bloom) conditions exist in a waterway if chlorophyll-A concentrations exceed 20 nanograms per litre (ng/L).

Chlorophyll-A is usually not measured at the sampling sites within the Study area. The measurement of Chlorophyll-A could be undertaken in farm dams, which still have deep water, to assess the impact of fertilizer and the potential for blue-green algae blooms.

Faecal Coliforms

The presence of faecal coliforms is an important indicator of pollution containing animal faeces. Moreover, they are an indicator of the possible presence of pathogenic bacteria and viruses. The relationship between levels of faecal coliforms and pathogenic viruses is weaker than that existing for pathogenic bacteria, due to the persistence of viruses in aquatic environments. The levels of faecal coliforms reported provide a gross indication of the potential health risks of water activities to humans (Williams and Callaghan, 1991). The standard at which swimming or primary contact with the water should be avoided is 150 faecal coliforms per 100mls.

4.4.2 Existing Water Quality

Water quality sampling within the Study area has been restricted to the surrounding major watercourses. Berowra Creek and the lower Hawkesbury River are sampled by State Government Authorities as part of wider Hawkesbury-Nepean Catchment area studies. These studies include "Water Quality in the Hawkesbury River and its Tributaries" (Williams and Callaghan, 1991) and "Hawkesbury-Nepean River System Interim Water Quality Report - June, 1990 to December, 1991" (Environment Protection Authority, 1992). The studies found that water quality in the Hawkesbury River improves downstream of Wisemans Ferry. However, there is a decrease in water quality around Wisemans Ferry, Gunderman and the MacDonald River probably associated with septic discharges (Williams and Callaghan, 1991).

Until recently, water quality monitoring undertaken by Hornsby Council concentrated on the receiving waters of Berowra Creek, and the sewage treatment plants. In 1991, Hornsby Council engaged a consultant to record and analyse water quality in Berowra Creek, with sampling fortnightly between February 1991 and February 1992 and then monthly until January 1993. The consultant concluded that rainfall was the most important influence on water quality. It was noted that:

"Local rainfall events in any of the small sub-catchments of Berowra Creek send relatively large volumes of freshwater down one or more of the many tributary streams. This freshwater runoff carries with it all the accumulated oils, rubbish, faecal material and organic matter from the streets, parks and private property in these catchments. Runoff from rainfall in the catchment of Berowra Creek reaches the main watercourse very rapidly and effects the estuarine section of the creek very quickly."

"Runoff from minor rainfall events in the much larger Nepean-Hawkesbury catchment may take several days to reach the lower Hawkesbury River estuary. The effect of this runoff on water quality in the lower estuary was usually quite small."

"Runoff from major rainfall events in the catchment sent huge volumes of water down river. This water transported large amounts of soil, logs and branches, organic debris, dissolved material and faecal bacteria from surcharging sewerage systems, farm land, urban properties and streets. This quantity of runoff effected water quality in the lower Hawkesbury River for several weeks" (Laxton, 1993).

In a submission to this study, the Environment Protection Authority advised that they have been conducting fortnightly water quality sampling at the Berowra Waters Ferry. The results indicated that both total phosphorus and total nitrogen levels were higher than 0.5mg/L for 90% of the samples. The major sources of phosphorus were identified as stormwater runoff from established sewerered urban areas and unsewered semi-urban areas. The major sources of nitrogen were identified as the West Hornsby and Hornsby Heights Sewage Treatment Plants. The impact of the high levels of phytoplankton growth indicated by the chlorophyll A levels found in the creek.

As part of this Study, and following the revision of Hornsby Council's water quality monitoring programme, sampling commenced within freshwater rural and natural catchments in the Study area. The addition of these sampling sites provides a more accurate indication of water quality within the study area and therefore conditions of different catchment types. However, it does not yet provide a comprehensive template, as the monitoring programme has only been collecting monthly samples since October 1994, and consequently does not provide long term baseline data. Table 4.1, below, summarises the results for each sampling parameter in terms of four catchment types (natural, rural, urban/rural and urban) for both dry and wet conditions. The urban catchments are located outside the Study area but are included for comparative purposes. The location of the sites is depicted in Figure 4.3.

The following observations can be made for the results of the different catchment types.

Natural catchments

The monitoring of natural or undeveloped catchments allows the ANZECCS standards adopted for Australia to be modified for local conditions and forms the reference data for comparison purposes. Table 4.1 indicates that the water quality of the natural catchment is within acceptable limits for all parameters.

The average pH recorded in the natural catchments are below, or at the bottom range, of the acceptable pH range adopted for fresh water (6.0 - 9.0). This indicates that fresh water creeks on Hawkesbury Sandstone may be more acidic than the typical watercourse in Australia. To confirm this trend, sampling needs to occur over a longer period than has currently been completed. The more neutral water quality may impact upon aquatic flora and fauna and affect the chemical and biological processes occurring in the watercourses.

The levels of conductivity, phosphorus and the various forms of nitrogen are below or at the lower limit of the standard, indicating a low levels of pollution by dissolved substances and nutrients. Similarly, the low levels of faecal coliforms, in both dry and wet weather, indicates minimal faecal pollution and waters safe for primary contact.

The turbidity levels are low in dry weather and a slightly higher in wet conditions, indicating generally clear water. The clear water in wet conditions suggests that little erosion and transportation of sediment and fine particles is occurring. Similarly, the level of Non-filterable residues (NFR) indicate low levels of suspended solids.

Table 4.1
Water Quality Summary

Parameter	Natural (dry)	Natural (wet)	Rural (dry)	Rural (wet)	Rural/urban (dry)	Rural/urban (wet)	Urban (dry)	Urban (wet)
pH	6.36	5.3	7.21	7.71	7.62	7.41	7.34	7.36
Temperature	17.77	21.0	17.44	20.18	19.01	17.75	17.59	20.18
Conductivity	0.25	0.19	0.57	0.35	0.65	0.47	0.44	0.38
Dissolve Oxygen	10.42	8.76	7.95	8.25	8.94	8.81	6.63	8.09
Salinity	0.01	0	0.02	0.01	0.02	0.02	0.01	0.01
Turbidity	0.83	2.0	6.98	33.5	13.44	41.72	22.49	61.25
NFR	2	2.5	3.2	8.07	2.47	13.17	5.51	23.58
NOX	0.01	0.02	0.04	0.79	8.89	5.72	0.22	0.82
Ammonia	0.01	0.02	0.04	0.03	0.03	0.04	0.02	0.04
Organic nitrogen	0.13	0.14	0.34	1.04	0.91	1.96	0.39	0.64
Total nitrogen	0.15	0.18	0.42	1.86	9.83	7.72	0.63	1.5
Total phosphorus	0	0.01	0.02	0.08	0.03	0.07	0.04	0.07
Faecal coliforms	7.5	54.0	331.3	769.44	78.78	761.56	471.45	1841.67

Note: Refer to preceding text for ANZECC standards

(Source: Hornsby Shire Council 1994b, 1995b, 1995c)

Rural catchments

Table 4.1 illustrates a comparison of the results for rural catchments with the natural catchment and indicates that the water quality within rural areas is of a lesser standard than that of the natural catchments. The levels of pH, conductivity, dissolved oxygen, salinity, Oxidised nitrogen and phosphorus are within the acceptable limits but are poorer than the natural catchment.

The increase in turbidity in wet weather conditions, indicates the erosion and transportation of sediment. The level of ammonia is above the standard in dry conditions and equal to the standard in wet conditions indicating pollution from effluent. The level of faecal coliforms in dry weather conditions are double the ANZECC standard and double again in wet weather. The results indicate that primary human contact should not occur in wet or dry weather. The source of the faecal coliforms may be from effluent treatment systems or livestock. The level of both ammonia and faecal coliforms in wet conditions indicates significant pollution from effluent in the watercourses which should be prevented.

Rural/urban catchments

The sampling results for the catchments with rural and urban development indicate a further deterioration of water quality from rural catchments. The levels of pH and conductivity have increased but are still within the acceptable limits of the standards. The levels of dissolved oxygen, salinity and ammonia are similar to those recorded in the rural catchments. There is a dramatic increase in the level of NOX in both dry and wet weather conditions, which also increases the total nitrogen levels. The high nitrogen levels were recorded from sampling sites in Berowra Creek, including the sampling site at Galston Gorge and may encourage the growth of algal blooms in the estuarine part of Berowra Creek. The faecal coliform levels are within the acceptable range in dry conditions although not in wet weather conditions, indicating that human contact with the water should be avoided in wet weather.

Urban catchments

The sampling for the urban catchments occurred outside the study area but is useful in providing an indication of the impact of urban development on a catchment. The urban catchments indicate

the poorest water quality of all the catchments. The results for turbidity, NFR and faecal coliform are significantly higher than the other catchments, especially in wet conditions. The turbidity and NFR levels indicate high levels of sediment erosion and transportation, which is reducing water clarity and smothering aquatic plants and animals, therefore affecting the ecosystem. The faecal coliforms levels indicate that contact with the water should be avoided at all times. The likely source of the pollution is discharges from sewage pipes, septic tanks and animal faeces. The dissolved oxygen levels in dry conditions are close to the lower limit of 6mg/L. If levels fall below 6mg/L, fish kills may result.

Overall, the results indicate that water quality deteriorates as land use within a catchment changes from bushland to rural to urban development. It is important that where possible measures are installed to mitigate the impacts on water quality.

4.4.3 Sources

The waterways are affected by pollution from many sources which can be described as either "point" or "diffuse" sources. Point sources are identified locations or areas to which pollution discharge can be directly attributed to such as pipes, sewage treatment plants, septic tanks, or the spillage of fuels at marinas, sediment from land clearing, extraction or reclamation activities. Diffuse or non-point sources are unidentified non-concentrated sources of pollution which can be attributed to runoff from large urban or agricultural areas. Runoff from these areas can include detergents, fertilisers, animal faeces, hydrocarbons, weeds, effluent, pesticides, litter, nutrients, sediment and trace metals.

Sources of pollution of particular relevance to the Study include pollution from residential uses, agricultural activities, boating activities and upstream inputs.

Residential Sources

Residential activities generate pollution which will enter and affect the waterway. These activities include land clearing, earthworks, effluent disposal, termite control, spillages of paint, fuel or other chemicals and the use of fertilizers and herbicides. Runoff from roads can contain spilt chemicals and oils, material from tyres and heavy metals, including lead from petrol.

The erosion hazard for many of the Soil Landscapes within the Study area is moderate to extreme (see Section 4.5). The most effective means of preventing soil erosion is to retain the natural vegetation cover, minimise earthworks and install soil erosion and sediment control measures. Soil erosion and sedimentation controls are also the most effective means of reducing pollution from runoff as most pollutants are absorbed and transported by particulate matter. The control of other pollution sources such as pesticides and fertilisers is best controlled by public information campaigns rather than by planning controls.

Reticulated sewage facilities are not available to the Study area and households rely on effluent and grey water disposal via pump-out, domestic sewage treatment plants, septic tanks and other domestic systems. In recent years concern has been raised about the effectiveness of on-site effluent disposal using these methods for infiltration in locations with steep slopes and shallow soils. If the systems are not working correctly, the effluent will percolate into the ground water and enter the watercourses with a consequent reduction in water quality.

Effluent systems which do not require water and infiltration for disposal, such as composting toilets, should be considered in areas unsuitable for on-site disposal. Effluent disposal systems will be discussed in more detail in Chapter Seven - Infrastructure, of this report.

An example of effluent pollution from the village areas was identified in July 1995, when officers from Hornsby Council sampled the watercourse near the intersection of Johnson and School Roads, Galston. The samples were tested with Nesslers agent, which indicates the presence of ammonia, an indicator of the presence of sewage. The tests proved to be positive indicating the presence of sewage effluent from septic tank discharges and illegal connections to the stormwater system in the Galston village. The tests were conducted in dry weather and highlight the water quality problems associated with effluent discharges from residential development.

The use of organo-chlorines for termite control in the construction of buildings can also affect water quality. Organochlorines can remain in the environment for many years and if allowed to drain into water systems may locate in animal and human food chains. This is especially of concern in locations where the dwellings are located adjacent to the waterway, such as along the

Hawkesbury River. Hornsby Council has been actively discouraging the use of this chemical for a number of years and from July 1995, the use of organo-chloride in NSW will be prohibited.

Agricultural Activities

Agricultural activities can impact on the water quality through the clearing of vegetation, erosion of soils, excessive or incorrect application of fertilizers, stock damaging watercourse banks, chemical contamination (herbicides, fungicides, insecticides) and animal wastes entering watercourses. The erosion of soils will be discussed in section 4.5 - Soil landscapes.

Little research has been undertaken into nutrient generation rates from agricultural land uses within the Sydney region. Table 4.2, below, summarises the available data for annual total phosphorus and total nitrogen generation rates for agricultural land uses within the Hawkesbury River catchment.

A comparison of these figures with the water quality sampling data (table 4.1) is not meaningful because the sampling results measure the receiving waters and are dependent upon pollutants being transported to the generation rates measure at the source. Land management practices may collect pollutants and prevent them from being transported downstream. Nevertheless, the figures in the table provide an indication of the levels of total phosphorus and total nitrogen generation rates by different agricultural activities.

Boating Activities

Whilst not a major source of pollution within the Study area, boating activities on Berowra Creek and the Hawkesbury River pollute the waterways. Pollution from boats and their occupants includes effluent, litter, hydrocarbons from boat engines and the use of anti-fouling paint. Further information on these sources is provided within the River Settlements Planning Study (Hornsby Shire Council, 1993).

Upstream Inputs

A further source of pollution within the Study area is from areas upstream of Wisemans Ferry and those areas of the Berowra Creek catchment outside the Study area. The catchment of the Hawkesbury River comprises residential, commercial, agricultural and industrial land uses which contribute to the pollution load. The

pollutants that enter the watercourses as a result of these land uses include fertilizers, pesticides, herbicides, detergents, litter, hydrocarbons, sewage, animal faeces, sediment, nutrients, micro-organisms, trace metals and weeds. Of particular concern is the affect of water discharged from sewage treatment plants. Within the Hawkesbury River catchment, excluding Berowra Creek, there are 21 sewage treatment plants managed by Sydney Water. The sewage treatment plants service a population of 480,000 persons and discharge approximately 120 megalitres a day of treated effluent into the catchment (Water Board, undated). There are another 29 known locations where treated wastes are discharged into the catchment by local Councils, hospitals and private organisations. The discharges mix with the water in the river and are transported along the Hawkesbury River past Wisemans Ferry to Broken Bay.

As previously indicated, the study area is located on the western side of Berowra Creek which is bounded on its eastern and southern sides by urban development. Activities in these parts of the catchment also contribute to the pollution load in Berowra Creek. The Hornsby West and Hornsby Heights Sewage treatment plants have been identified as a major source of nutrients entering Berowra Creek. The treatment plants contribute, on an annual basis, 22% of the total phosphorus and 85% of the total nitrogen load entering Berowra Creek (Waste Water and Reuse Planning, 1994). The urban areas within the Berowra Creek catchment have also been identified as contributing to the pollution load of Berowra Creek and comprise the dominant source of phosphorus which originates from lawn

fertilisers and detergents (Water Board, 1994). The sewage treatment plants are also a source of faecal bacteria especially during rain events when the volume of material entering the plant exceeds its capacity, resulting in bypasses.

The erosion of sediments within upstream areas is causing siltation and turbidity in Berowra Creek. It has been estimated that up to 23,000m³ of soil is transported to the major waterways from urban areas each year (Parameter, 1995). Sediments are carriers of pollutants, including nutrients, and their control would assist nutrient loads.

4.4.4 Water quality improvement

The previous two sections of this report have indicated that water quality within the study area and the Berowra Creek catchment has deteriorated from that found in natural conditions. Sampling results for turbidity, phosphorus, nitrogen and faecal coliforms highlight the impact that rural and urban land uses have on water quality. The extrapolation of the results suggests that continued rural and urban development within the study area will further deteriorate water quality, unless mitigation measures are installed.

As noted in Section 2.2.4, Hornsby Council has entered into an agreement with other statutory authorities to achieve Ecologically Sustainable Development (ESD) in the Berowra Creek catchment. Consequently, if further land use changes are to occur within the study area, the condition of the catchment should not deteriorate and measures should be installed to improve water quality.

Table 4.2
Average annual total phosphorus and total nitrogen generation rates

	Total phosphorus kg/ha/yr	Total nitrogen kg/ha/yr
bushland	0.10 ± 0.10	1.50 ± 0.50
unsewered peri-urban	0.60 ± 0.30	4.00 ± 3.00
established unsewered lands	5.30 ± 1.70	5.00 ± 2.00
intensive vegetable	8.00 ± 4.00	8.00 ± 3.00
orchards	0.30 ± 0.20	4.70 ± 3.00
fertilized grazing	1.25 ± 0.50	8.00 ± 4.00
unfertilized grazing	0.25 ± 0.10	8.00 ± 0.50
disturbed lands	20 ± 10	63 ± 40

(Source: Cuddy et al 1994)

In terms of water quality, the most appropriate measure is to control pollution at its source, thereby restricting the movement of pollutants into the waterway. Control measures are necessary both within the study area and within the catchment at upstream locations.

Guidelines for the protection of the natural drainage system should be introduced for the study area. Drainage from sites should reflect the pre-existing or natural situation in terms of location, quantity, quality and velocity of runoff. The strategy should include the continuation of the water quality monitoring program, water conservation strategies and waste water disposal strategies. Water quality improvements should also be considered in the context of stormwater drainage systems which are discussed in section 7.7 of this report.

4.5 Soil Landscapes

The soils within the study area have been formed by the interaction of 5 factors, namely geology, climate, living matter, time and soil forming processes. The soil forming processes include physical, chemical and biological processes such as oxidation, reduction, hydration, solution, leaching and mixing. Within the study area, the factors of time and climate are relatively constant and therefore variations in soil type is more related to geology and landscape position. Soils have been derived from the underlying geology of sandstone and shales.

In recent times, soils have been mapped in terms of soil landscapes, which are areas of land that have discernible topography and soils that can be mapped and described (Chapman & Murphy, 1989). Therefore, soil landscapes relate to geology and have a characteristic landform, i.e. ridge top, valley side, valley bottom or floodplain. Seventeen soil landscapes have been mapped within the Study area, a summary of the soil landscapes is provided in Table 4.3 and the distribution of the soil landscapes is mapped in Figure 4.4.

The soil landscapes with most extensive distribution within the Study area are the Glenorie, Hawkesbury and Lucas Heights Soil Landscapes. The Glenorie Soil Landscape occurs in the southern part of the Study area along the gentle sloping ridge tops between Dural and Glenorie and between Dural, Galston, Arcadia and Fiddletown. The Glenorie Soil Landscape has been derived from the Wianamatta Group of shales and consists of shallow to moderately deep

podzolic soils (strong texture contrast between the loamy topsoil and clay subsoil) with red podzolics occurring on crests, red and brown podzolics on upper slopes and yellow podzolics on lower slopes. The soil materials are loams and clays which have a low to moderate fertility. Despite the low to moderate fertility, the soil landscape is used extensively for agriculture within the Study area. The erosion hazard for non-concentrated flows range from moderate to high and for concentrated flows is high. The calculated soil loss generation rates for the first 12 months of development is 65t/ha for topsoil and 117t/ha for subsoil. The soil landscape has a high capability of supporting rural development and a low to moderate capability of supporting urban development (Chapman and Murphy, 1989).

The Hawkesbury Soil Landscape occurs throughout the study area and is associated with the steep hillsides and rocky benches of the Hawkesbury Sandstone. The Hawkesbury Soil Landscape consists of shallow sandy soils (less than 50cm) which are discontinuous, with sandstone outcrops and boulders covering up to 50% of the ground surface. The soil landscape has a very low fertility, to which the native plants have adapted, and is generally less suitable for agricultural production. The erosion hazard for non-concentrated flows ranges from moderate to extreme and for concentrated flows is extreme. The calculated soil loss generation rate for the first 12 months of development is 109t/ha for topsoil and 394t/ha for subsoil. The Hawkesbury soil landscape has a low capability for urban or rural development because of the constraints associated with slopes, erosion hazard and low fertility (Chapman and Murphy, 1989).

The Lucas Heights Soil Landscape is associated with the Mittagong Formation and occurs along the ridges north of Glenorie and along Canoelands Road. Soil materials are moderately deep and vary from sandy loams through clay loams to clays. The soils have a low fertility which is capable of supporting grazing but generally not regular cultivation. The erosion hazard for non-concentrated flows ranges from slight to extreme and for concentrated flows is high. The calculated soil loss generation rate for the first 12 months of development is 103t/ha for topsoil and 97t/ha for subsoil. The Lucas Heights Soil Landscape has a high capability for urban development and is capable of supporting grazing and some cultivation (Chapman and Murphy, 1989).

Table 4.3
Summary of Soil Landscapes

Geology	Soil landscape	Landscape position	Rural capability	Urban capability	Erosion hazard	Subsoil Dispersible
Maroota Sand	Maroota	Ridge top	Low Mod	- High	High	No
Wianamatta Group	Glenorie	Ridge top	High	Low Mod	- Mod Very high	- Yes
Hawkesbury sandstone	Somersby	Ridge top	High	High	Low Very high	- Some
	Faulconbridge	Ridge top	Mod	High	Low Mod	- No
	Hawkesbury	Valley side	- Not capable	Not capable	Mod	- No
	Lambert	Valley bottom	Not capable	Low Mod	- Very high - extreme	Some
	Gymea	Valley side	Not capable	Low Mod	- High extreme	- Some
	Sydney Town	Valley side	Low Mod	Low Mod	- Very high	Yes
	Deep Creek	Valley bottom	Low	Low	Low to extreme	No
	Oxford Falls	Hanging valleys	Low	Low Mod	- High extreme	- No
Mittagong Formation	Lucas Heights	Ridge top	Mod	High	Mod High	- No
	Watagan	Valley side	Not capable	Not capable	Extreme	Yes
	Erina	Valley side	Mod	Low Mod	- Very high	Yes
Igneous	Hornsby	Residual outcrops	Low	Low Mod	- Low extreme	- Yes
Alluvium	Hawkesbury River	Floodplains	Low Mod	- Not capable	Low	No
	Mangrove Creek	Mudflats	Not capable	Not capable	Low	Some
	Tacoma Swamp	Swamps	Not capable	Not capable	Low	No

(Source: Chapman and Murphy, 1989, Murphy, 1992)

4.5.1 Erosion Hazard

Table 4.3 indicates that 14 of the 17 soil landscapes evident in the study area have a moderate to extreme erosion hazard. The table also indicates the dispersibility of the subsoils of each soil landscape. Dispersible subsoils consist of silts and clays which when eroded cannot be trapped using sediment traps, because the particles remain in suspension. To reduce the pollution of these soils, a flocculent such as gypsum or alum needs to be added to assist the settling of the particles.

Any activity involving earth disturbance is usually considered to be an unstable soil erosion situation, as the ground cover or vegetation is removed. An unstable soil erosion situation is apparent where the erosion rate exceeds 5t/ha/yr (Parmeter, 1995). The Soil Erosion Survey of Hornsby Shire (Parmeter, 1995) found that erosion rates for lands being cropped were likely to be in the range 5t/ha/yr to 30t/ha/yr and permanent pasture 0.1t/ha/yr to 1t/ha/yr. Estimates for horticulture, animals establishments, orchards and extractive industries were not specified because of the

dependence on land management practices, slope and the stage of cultivation.

Soil erosion and deposition can cause adverse impacts on the natural environment, including:

- * the loss of topsoil;
- * the turbidity of the waterway;
- * the reduction in the waterway capacity;
- * the smothering of aquatic plants and fauna;
- * the scouring of land, creating a poor visual environment; and
- * the carriage of chemical pollutants (eutrophication of water bodies is often a result of sediment entering waterways with nutrients and phosphates attached).

It is appropriate to mitigate against the potential problems of soil erosion, through a number of measures. Firstly, planning strategies should determine what land uses are suitable for each soil landscape and land use tables prepared accordingly. Secondly, as part of the development approval process, Soil and Water Management Plans (SWMP) should be prepared and implemented on-site. The recommended measures for SWMP's, are detailed in the Soil Conservation Services' publication, "Urban Erosion and Sediment Control" (1992).

4.5.2 Soil Capability

Soil capability is a measure of the ability of land to support urban development, permanent agriculture or pasture production without permanent damage. Table 4.3 indicates that the soil landscapes most suitable for agricultural use are Glenorie and Somersby. The most suitable for urban development are Maroota, Somersby and Faulconbridge.

The soil landscapes which have a low capability or are not capable of rural and urban development are the Hawkesbury, Deep Creek Watagan, Hawkesbury River, Mangrove Creek and Tacoma Swamp Soil Landscapes. It is acknowledged that development has occurred on these soil landscapes, although it may have resulted in high erosion, slippage, cracking or flooding. It is important that the land capability of an area is considered rather than historical practices.

NSW Agriculture has assessed the suitability of the soils within the Study area for agricultural production. The Agriculture Suitability classification survey uses a 5 class system of classification which provides an indication of the lands potential productivity value. The

classification is based upon the effects of climate, topography and soil characteristics, the cultural and physical requirements for various agricultural activities as well as existing socio-economic factors. These include local infrastructure and geographic location, both of which combine to determine the productive potential of the land and its capacity to sustain agricultural activities. The distribution of the classes are depicted in Figure 4.5, and are described in Table 4.4.

As indicated in table 4.4 and figure 4.5, no land within the study area has been identified as having a Class 1 classification. The more fertile shale ridges at Glenhaven, Dural, Middle Dural, Galston, Arcadia and Glenorie and along the Hawkesbury River floodplain have a Class 2 or 3 classification. Maroota and Canoelands Ridge are depicted as having a Class 3 or 4 classification. The remainder of the area, including Marramarra National Park and Berowra Valley Bushland Park, have Class 5 classification which reflects the steep Hawkesbury Sandstone topography and infertile soils.

The Rural Land Evaluation Manual (Department of Planning, 1988) recommends the consideration of the following general principals concerning the protection of agricultural land:

- * *Prime crop and pasture lands (classes 1, 2, 3) should be considered for protection from competing land uses. Such lands should not be used for incompatible development where land of lower agricultural quality is available and suitable for the purpose.*
- * *Class 2 lands are of superior quality and are of limited extent; they are worthy of protection because of their state and regional importance and serious consideration should be given to retaining them for agriculture.*
- * *Class 3 lands constitute the major proportion of agricultural lands in New South Wales; they should not be alienated from agricultural production if adequate and suitable areas of classes 4 or 5 land are available. Social and economic factors should be considered when making recommendations in areas of class 3 or lower quality land which are used extensively for full-time farming.*
- * *Consider protecting areas from incompatible development which are unique in the state for an agricultural activity unless there are strong economic reasons for not doing so.*
- * *When recommending rural areas for non-agricultural uses, consider the particular requirements of the use. For rural*

residential and/or hobby farm uses, the former may require non-productive land preferably with trees (usually falls into class 4 or 5), while the latter may require land with pastures suitable for year round grazing (land of class 4 may often be suitable). Because of the environmental fragility of land of classes 4 or 5, use care when proposing more intensive uses to prevent land degradation, erosion and stream siltation (Department of Planning, 1988).

Whilst there may be some conjecture about the above agricultural principles, it is important that urban and rural land uses occur on land that is capable of supporting the use. In instances where the soil is not capable of supporting the land use, high erosion, stability problems, flooding or the cracking of structures can result. Consequently, the development of land use strategies for the study area need to consider the capability of the soil.

4.5.4 Acid Sulphate Soils

Acid Sulphate Soils are found throughout Australia in locations adjacent to watercourses

including the Hawkesbury River. Acid sulphate soils are significant as they have the potential to cause dramatic fish and plant kills in rivers.

Acid sulphate soils have their origins in the end of the last glaciation, 20,000 years ago, when sea level rise inundated low-lying land on continental margins. That process mobilised sediments and deposited them in coastal embayments, to be colonised by mangroves. The mangroves locked the sediment in place and added organic matter. In the absence of oxygen, bacteria breaking down the organic material reduced the sulphate from seawater to iron pyrite or iron sulphide, at concentrations of up to 15% in the top metre or more of the sediment profile. While it is covered by water and thus insulated from the atmosphere, this pyritic layer is an innocuous 'potential acid sulphate soil', or PASS. When coastal land is drained or cleared for agriculture or development, oxygen can reach the iron sulphide and oxidise it to sulphuric acid. In some areas, this acid is strong enough to corrode steel and concrete. Flooding can wash the acid into rivers causing fish kills and impacting upon the fishing and prawning industries (Greagh 1992, 1993).

Table 4.4
Agricultural land classification

Class	Amount of land in Study area (km ²) ⁽¹⁾	Description
Class 1	0.00	Arable land suitable for intensive cultivation where constraints to sustained high levels of agricultural production are minor or absent.
Class 2	4.48	Arable land suitable for regular cultivation for crops but not suited to continuous cultivation. It has a moderate to high suitability for agriculture but edaphic (soil factors) or environmental constraints reduce the overall level of production and may limit the cropping phase to a rotation with sown pastures.
Class 3	39.80	Grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with pasture. The overall production level is moderate because of edaphic or environmental constraints. Erosion hazard, soil structural breakdown or other factors including climate may limit the capacity for cultivation and as a result soil conservation or drainage works may be required.
Class 4	25.31	Land suitable for grazing but not for cultivation. Agriculture is based on native pastures or improved pastures established using minimum tillage techniques. Production may be seasonally high but the overall production level is low as a result of major environmental constraints.
Class 5	106.47	Land unsuitable for agriculture or at best suited only to light grazing. Agricultural production is very low or zero as a result of severe constraints including economic factors which preclude land improvement.

Note (1): Area excludes Marramarra National Park (132.3km²)

(Source: DOP, 1988)

Along the lower Hawkesbury River, potential acid sulphate soils occur beneath mangrove stands and other wetland areas. The draining of these lands has the potential to oxidise the pyrite creating the acid and its impact upon flora and fauna. Consequently, areas of potential acid sulphate soils should be protected from development or appropriate measures introduced to mitigate their potential impacts.

4.5.5 Contaminated Land

Many land uses can, or have the potential to, contaminate soil which can affect future land uses. Industries such as chemical and petrochemical plants, gas works and paper and printing works have the potential to contaminate the soil on which the industry is located. Contamination of rural lands can result from landfilling and waste disposal sites, petrol stations, stock dipping areas, pesticide storage areas or land heavily treated with chemicals for agriculture.

In recent years there have been numerous cases of excavated material from urban areas being tipped on properties in rural areas. The filling of land may have the effect of killing trees, introducing pollutants and weeds, causing erosion and sedimentation. Generally, filled land cannot be built upon as the fill material has not been compacted and its composition is unknown. Hornsby Council has sought the declaration of filled areas on rural properties as "unhealthy building land", which prevents building on the designated areas.

Hornsby Council has established a register of known and potentially contaminated sites which consist of landfill sites, such as Wisemans Ferry Waste Depot, and petrol stations. The effect of agricultural activities on soil has not been quantified as the degree of contamination would depend upon the land management practices on each property.

In the event of rezoning or development proposals on land suspected of contamination, the level of contamination should be determined through soil sampling. The potential contamination of adjacent properties through runoff, ground water flows and dust also needs to be examined.

4.6 Flora

Hornsby Shire is well known for its extensive bushland areas both in the urban and rural area. Approximately 81% (247km²) of the study area is

covered by bushland. Of this area, 132km² of bushland is protected within Marramarra National Park and 10km² within Berowra Valley Bushland Park (west of Berowra Creek), the remainder is located throughout the Study area in smaller reserves, Crown land and privately owned land, ranging in size from 2ha to over 5500ha.

Vegetation is an important part of the natural environment as it provides a habitat for fauna, maintains biodiversity including local genetic stock, provides microclimate control, enhances scenic quality, reduces soil erosion, and assists in protecting water quality. Human occupation in bushland areas has impacted upon vegetation through clearing, weed invasion, pollution and altering the natural fire regime. Fires in urban bushland need careful management to minimise the threat to residents flora and fauna. The issues of fauna and bush fires are discussed in more detail in the sections 4.7 and 4.8.

4.6.1 Native Vegetation in 1788

The following description of the native vegetation in 1788 has been derived from a report presented to the Study subcommittee by Jocelyn Howell (1994).

*"In 1788 the shale areas (around the present Dural, Galston and Glenorie) were covered with open-forest of trees suited to the more fertile soils, including Grey Ironbarks (*Eucalyptus paniculata*) Turpentines (*Syncarpia glomulifera*) White Stringybarks, (*Eucalyptus globoidea*) and, less commonly, Red Mahoganies (*Eucalyptus resinifera*), Wollybutts, (*Eucalyptus longifolia*), Blackbutts (*Eucalyptus pilularis*), Sydney Blue Gums, (*Eucalyptus saligna*) growing where conditions were particularly favourable. These forest trees were likely to be at least 30 metres tall, with an understorey of smaller trees including Forest Oak (*Allocasuarina torulosa*), Hickory Wattle (*Acacia implexa*), Cheese Tree (*Glochidion ferdinandi*) and colourful shrubs in the drier areas, and *Pittosporum undulatum*, vines and ferns in the moister drainage lines.*

*On the ridgelines in locations where shale gave way to sandstone there was often a transitional area with a distinctive assemblage of species, often including the Grey Gum (*Eucalyptus punctata*), Stringybarks and less commonly the Scaly-bark (*Eucalyptus squamosa*) with some shrub species particular to this habitat (e.g. *Darwinia biflora*).*

The sandstone topography gives rise to a great variety of habitats because of its rugged nature, ridgetops, slopes of varying steepness facing north, east, south or west (each has different characteristics of sunlight and moisture availability), gullies and valley bottoms with varying amounts of deposited soil with different degrees of shale influence from soil washed down from the shale covered tops over time.

Ridgetops and exposed north and west facing slopes tend to support woodland, open-forest grows on the more sheltered east and south facing slopes as well as the lower parts of the exposed slopes, small sandstone creeklines support a distinctive group of species, and where valleys are sheltered and enriched by shale derived soil, dense open-forest including Blackbutts, and Coachwoods. As well, there are lenses of shale within the sandstone, giving rise to local variation in soil fertility and drainage, and consequently in plant species composition. For example, patches of shrubby heaths and sedgy heaths occurring amongst woodland or open-forest on sandstone plateaus or hillslopes are related to soil depth and drainage conditions often associated with shale lenses.

Downstream from Wisemans Ferry and along the lower reaches of Berowra and Marramarra Creeks associated with the more fertile Narralan Group of soils, Rough barked Angophora and Forest Oak characterise the open forest. Thus the "bush" on the sandstone country is not all the same, and in fact in a relatively small area of sandstone terrain there can be a tremendous variety of habitats and plant species" (Howell, 1994).

Over the 200 years since 1788, human activity has led to clearing of much of the vegetation for forestry, agricultural and residential purposes. The more fertile ridgeline shale soils, which are more suitable for agriculture and housing, have been cleared of vegetation to a greater extent than vegetation on the less capable sandstone soils.

4.6.2 Vegetation in 1995

Despite the land management practices of the past 200 years, Hornsby Shire still has a high diversity of native plant species, with in the order of 1,000 species occurring. Of these species, 24 are considered to be rare or threatened, 18 of which occur within the study area (Appendix E) (Land

and Environmental Planning, 1994). Combinations of these species form 25 different vegetation communities within the study area. The location and distribution of the communities is dependent upon terrain, soil type, geology and microclimate variations. Vegetation surveys undertaken within the study area, excluding Marramarra National Park, which mapped the 25 different vegetation communities, indicate that the extent of communities range from 2ha to over 5,000ha (Smith and Smith 1990, 1993). Table 4.5, below, summarises the communities and their occurrence.

The Hornsby Shire Bushland survey (Smith and Smith 1990) found that the communities associated with the Hawkesbury Sandstone are well represented in public reserves, such as Marramarra National Park and Berowra Valley Bushland Park. The infertile soils and steep terrain limits other uses and restricts clearing activities. Community B however is not found in the bushland reserves and is restricted to an 173ha area along the upper reaches of Colah Creek (Smith & Smith, 1990). Within the Study area Communities E, H and I have a distribution of less than 20ha each, although they have a greater distribution outside the Study area.

The Bushland Survey also found that the plant communities related to the more fertile soils have limited distribution within the study area and have to a large extent been cleared for rural and urban development. Communities J, K, M and N have limited distribution throughout the Shire, including the study area.

The communities found on slopes adjacent to the Hawkesbury River and Berowra Creek are generally well represented in major reserves, with the exception of Community R which is more common outside the reserves. Communities P, V and X, associated with alluvial flats along the Hawkesbury River and other watercourses are poorly conserved within the reserves, as a consequence of clearing activities and the limited occurrence of alluvial flats in reserves.

The two intertidal communities, communities W (mangroves) and Y (saltmarsh) are poorly represented in major reserves, as reserve boundaries usually coincide with the high tide level. Along the waters edge of the Hawkesbury River, Berowra Creek and their tributaries, the foreshore vegetation consists of the Grey Mangrove (*Avicennia marina*) and River Mangrove (*Aegiceras corniculatum*). Significant stands of mangroves exist at Courangra Point,

Gentlemans Halt and within Big Bay in Marramarra Creek. Elsewhere along the watercourses and the tributaries where the land is steeper, the mangroves exist as a narrow band, only 1 to 2 trees wide. The larger stands were

identified as part of the NSW Agriculture and Fisheries Wetland Survey of NSW (West et al, 1985) and as part of the Hornsby Shire Bushland Survey (Smith and Smith, 1990).

Table 4.5
Flora Communities

Community	Form and dominant tree species	Area (ha)	% of community Shire's distribution
Communities associated with Hawkesbury sandstone soils:			
A	Open forest - <i>Eucalyptus piperita</i> , <i>Angophora costata</i>	2552	40.0
B	Open forest - <i>Eucalyptus piperita</i> , <i>Angophora bakeri</i>	173	97.7
C	Woodland - <i>Eucalyptus gummifera</i> , <i>E haemastoma</i> , <i>E oblonga</i>	371	56.8
D	Woodland - <i>Eucalyptus punctata</i> , <i>E gummifera</i> , <i>E haemastoma</i>	4182	95.8
E	Woodland - <i>Eucalyptus sieberi</i> , <i>E gummifera</i> , <i>E haemastoma</i>	4	4.5
F	Woodland - <i>Eucalyptus racemosa</i> , <i>E gummifera</i> , <i>Angophora costata</i>	439	34.8
G	Low open - woodland - <i>Eucalyptus haemastoma</i> , <i>Angophora hispida</i> - <i>Banksia ericifolia</i>	324	54.9
H	Rock platform heath	2	22.2
I	Sandstone swamp	13	61.9
Communities Associated with More Fertile Soils:			
J	Tall open - forest - <i>Eucalyptus saligna</i>	5	12.8
K	Tall open forest - <i>Eucalyptus pilularis</i> , <i>E saligna</i> , <i>E paniculata</i>	6	16.2
L	Tall open forest - <i>Eucalyptus pilularis</i> , <i>Angophora costata</i> , <i>Syncarpia glomulifera</i>	514	53.6
M	Open forest - <i>Syncarpia glomulifera</i> , <i>Eucalyptus paniculata</i> - <i>Angophora costata</i>	154	87.0
N	<i>Eucalyptus agglomerata</i> , <i>Angophora floribunda</i>	11	100.0
O	Open forest - Warm temperate rainforest	77	50.7
Communities Associated with the Hawkesbury River System:			
P	Tall open forest - <i>Eucalyptus pilularis</i> , <i>Angophora floribunda</i>	22	61.1
Q	Open forest - <i>Angophora floribunda</i> , <i>Allocasuarina torulosa</i>	197	54.1
R	Open forest - <i>Angophora bakeri</i> , <i>Eucalyptus punctata</i> , <i>E tereticornis</i>	409	100.0
S	Woodland - <i>Angophora costata</i> , <i>Eucalyptus gummifera</i> , <i>E umbra</i>	2	3.0
T	Woodland - <i>Eucalyptus eximia</i>	293	81.6
U	Open forest - <i>Eucalyptus robusta</i>	8	100.0
V	Closed forest - <i>Casuarina glauca</i>	78	91.8
W	Mangroves	298	84.4
X	Closed scrub - <i>Melaleuca ericifolia</i>	15	100
Y	Saltmarsh	67	88.2
	Total:	10214	ha

(after: Smith & Smith, 1990)

The waterway is also the habitat of seagrasses which were not considered in the terrestrial bushland surveys. The NSW Agriculture and Fisheries Wetland Survey of NSW (West et al, 1985) identified the seagrass, known as eelgrass (*Zostera capricorni*), as occurring within some of the tributaries of Berowra Creek, but not along the Hawkesbury River. The significance of the seagrass beds along Berowra Creek and the strategies for their protection have previously been assessed under the River Settlements Planning Study (Hornsby Shire Council, 1993).

4.6.3 Flora Management

The management of the flora of the study area can be considered at three levels, being bushland reserves, communities and species.

Bushland Reserves

Marramarra National Park and Berowra Valley Bushland Park are the largest remnant bushland areas within the Study area, and form core fauna habitats. Combined with bushland in adjoining areas, these areas are capable of sustaining native fauna and plants in the long term, and are locations where essentially natural biological processes can be retained. To improve the ability of core bushland areas so as to retain their biological diversity in the long term, it is desirable to ensure linkages between such areas to allow species to migrate. Such linkages are particularly important in allowing recolonisation by fauna and plant species from nearby areas following disturbances such as bushfires (Land and Environmental Planning, 1994).

The Fauna Corridors and Vegetation Links Study identified important bushland areas which are fauna habitats (Land and Environmental Planning, 1994). The Study found that movement of many terrestrial species is limited by the bushland being fragmented by roads and development. However, some species could maintain their mobility through the establishment and maintenance of bushland corridors.

It is important that the core bushland area, other significant bushland and fauna corridors are protected to maintain flora and fauna biodiversity and linkages between areas. To facilitate the protection of these identified core bushland areas, other previously unrecognised significant bushland parcels and corridors are proposed to be incorporated into a Draft Local Environmental Plan.

Communities

Based on distribution, the communities most in need of conservation within the Shire and study area are communities B, E, H, I, J, K, M, N, P, R, S, W, X and Y.

The management of communities can occur through the reservation of land, restrictions on clearing, planning controls and landscaping controls.

The reservation of land is one means of protecting communities and their species. Communities located within Marramarra National Park, Berowra Valley Bushland Park and other reserves are protected from development through their reservation status and by the legislation controlling land use within those areas.

Species

As noted previously, 18 rare and threatened species occur within the study area (Appendix E). The protection of rare species is important to prevent extinction and to maintain biodiversity. The threats to rare species include land clearing for agriculture or urban development, fire frequency, weed competition, roadworks, grazing, plant collecting, flooding, pollution, salinity, dieback, recreational activities and mining.

The identification of rare species through vegetation surveys is the first step towards preservation. Development proposals for areas covered by bushland or likely habitats of rare species should be accompanied by a vegetation survey. Where rare species are identified, a number of different conservation strategies could be considered, including modification of the development proposal, land acquisition, protection from fire, habitat protection, cultivation of the species, education, habitat management and research. The appropriate method of conservation varies between species, their form, habitat, location and abundance.

Within Hornsby Shire, clearing is restricted by a tree preservation order and zoning controls. The Tree Preservation Order requires that persons gain Council consent prior to the cutting, topping, lopping, removal, injury or willful destruction of trees greater than 3m in height. Certain species of weeds and noxious plants are excluded from the order.

Steep land within the study area is generally zoned Environmental Protection B (River

Catchment). This zone aims to limit the type of development permitted to development which will not significantly impact upon the natural environment. The Environmental Protection (River Catchment) zoning also generally coincides with lands identified as Protected Lands under the Soil Conservation Act (refer section 4.4.1 of this report). The purpose of the protected lands designation is to preserve the natural vegetation and to minimise erosion, sedimentation and visual scarring of the landscape, particularly adjacent watercourses and stream banks.

Mangroves are also an important aspect of the environment, providing:-

- * shelter and habitat for a rich and concentrated array of marine animals and birds;
- * a nursery area for juvenile fish;
- * a means of reducing shoreline erosion;
- * large amounts of organic matter used in the estuaries food chain, in the order of 6 tonnes per hectare per year;
- * a visual screen between the land and waterway; and
- * a sediment trap, for reducing nutrient loads of streams that pass through the stands.

In terms of the management of wetland communities, the NSW Fisheries "Estuarine habitat guidelines" (1991) recommend that:

- * all wetlands (seagrasses, mangroves and salt marshes) be mapped and zoned or reserved for environmental protection;
- * foreshore buffer zones of at least 30m width be created to protect foreshores separate developments from sensitive habitats and allow for changing distribution; and
- * mangroves are included in tree preservation orders.

The larger stands of saltmarsh (community X) and mangroves (community W) which are recognised as significant are zoned Environmental Protection A (Wetland) under the Hornsby Shire Local Environmental Plan. The zoning is a means of protecting and labelling the mangrove areas in recognition of their environmental significance and allows land use to be controlled. A number of these stands are also identified under SREP No. 20 - Hawkesbury Nepean River, which also restricts development. The wetlands identified under SREP No. 20 have recently been reviewed by the Department of

Urban Affairs and Planning and now include only those wetlands of regional or state significance.

As part of this study, the significance of the wetlands along the Hawkesbury River and their boundaries was assessed. In particular, the differences in the mapped wetland boundaries depicted on SREP No.20 (Amendment No.2) and the HSLEP were reviewed and a number of discrepancies were identified. These discrepancies should be rectified to provide a clear indication of the actual wetland areas (Appendix F).

Mangroves are also protected under Fisheries Management Act 1994 and Hornsby Council's Tree Preservation Order. Under the Act, a permit issued by NSW Fisheries is required to cut, remove, damage or destroy mangroves, sea grasses and certain other marine vegetation. The Tree Preservation Order requires Hornsby Council to approve the cutting, topping, lopping, removal, injury or willful destruction of trees greater than 3m in height. Certain species of weeds and noxious plants are excluded from the order.

In evaluating development adjacent to land zoned or reserved for public open space purposes, such as the National Parks and Nature Reserves, Council must also have regard to State Environmental Planning Policy No. 19 and consider:

- * *the need to retain any bushland on the land;*
- * *the effect of the proposed development on bushland zoned or reserved for public open space purposes and, in particular, on the erosion of soils, the siltation of streams and waterways and the spread of weeds and exotic plants within the bushland; and*
- * *any other matters which, in the opinion of the approving or consent authority, are relevant to the protection and preservation of bushland zoned or reserved for public open space purposes.*

To supplement the controls detailed in SEPP No. 19, Council has adopted a development code for land adjoining bushland zoned or reserved for public open space. The code entitled "Requirements for Development, Building and Subdivision on Land Adjoining Bushland" incorporates Council's requirements for development, building and subdivision on land adjoining bushland. The code includes measures addressing disposal of roof water; disposal of surface water; protection of bushland from soil

erosion and sedimentation; encroachment into bushland and bush fire protection.

It is important that plants used for landscaping do not invade the natural bushland, as they can outcompete the native species. Hornsby Council requires landscaping plans to be submitted with Development Applications to ensure appropriate vegetation is planted. The landscape plans are also used to prevent large barren areas and to improve screening and the visual appearance. Also potentially detrimental to native species is the disposal of effluent and garden and agricultural refuse which increases the nutrient level in the soil and can encourage the growth of weeds.

To provide protection for the natural environment the existing controls should be incorporated into the planning strategy for the study area.

4.7 Fauna

Fauna within the Study area can be considered in terms of terrestrial and aquatic species.

4.7.1 Terrestrial Species

The study area contains extensive areas of bushland, which provides a variety of habitats, from ridge tops to valley bottoms and watercourses. A total of 388 native terrestrial vertebrate animal species occur within the Shire, which includes 29 frogs, 51 reptiles, 55 mammals and 253 birds. In addition, 18 introduced fauna species have been recorded. Of this total number, some 38 species are considered endangered or threatened (Land and Environment Planning, 1994). It is likely that identified, endangered or threatened species which occur within the Study area, occur due to the extensive area and variety of habitat. More information on the individual species is contained within Appendix 1 of "Fauna Corridors and Vegetation Links in Hornsby Shire Study" (Land and Environment Planning, 1994) which provides species lists, preferred habitats, migration information and number of sighting records.

The number of invertebrate species, such as insects and spiders, occurring within the study area is unknown, but is likely to be in the order of 100,000 species.

4.7.2 Aquatic Species

The Hawkesbury River, Berowra Creek and their tributaries also provide a habitat to a variety of

molluscs, crustaceans and fish. Little information is known about the aquatic fauna in the Study Area. The Sydney Rock Oyster (*Saccostrea commercialis*) is probably the best known aquatic mollusc in Sydney and grows naturally along the sandstone estuaries of the study area as well as being cultivated in large oyster leases within shallow bays and inlets.

The National Parks and Wildlife Service's species list for the North Metropolitan District records some 90 species of fish occurring within Cowan and Berowra Creeks and the Hawkesbury River including eels, seahorses, sharks, and other fish. The Hawkesbury River and the mouth of Berowra Creek are used by commercial anglers who trawl for fish and prawns. Berowra Creek and its tributaries are also popular with recreational anglers.

4.7.3 Species Protection

The best means of protection of fauna species is through the maintenance of their habitat. Legislation is a mechanism to ensure habit is maintained and species are protected. Two examples of the use of legislation in NSW are the Endangered Fauna (Interim Protection) Act and State Environmental Planning Policy No. 44 (SEPP No. 44) - Koala Habitat Protection.

In December, 1991 the Endangered Fauna (Interim Protection) Act was enacted. The most significant requirement of the Act is the requirement for Fauna Impact Statements (FIS). A FIS is required to accompany a development application where the development proposal is likely to significantly affect the environment of endangered fauna. The Endangered Fauna (Interim Protection) Act also applies to aquatic species. The Revised Schedule 12 of the National Parks and Wildlife Act does not list aquatic species apart from marine mammals (whales, dolphins and seals).

More recently, SEPP No. 44 - Koala Habitat Protection, was gazetted. The policy aims to protect the habitat of Koalas by limiting development in core koala habitats. Koala's have been observed within the study area, however, colonies are generally limited to Maroota State Forest and Marramarra National Park. Individuals or pairs are occasionally sighted beyond these colonies.

Aquatic species are also protected under the Fisheries Management Act, which regulates the

commercial fishing of waterways through bag limits and fishing restrictions.

The importance of the preservation of native fauna has been recognised by Hornsby Council, which has introduced a policy entitled "Preservation of Native Fauna". The policy applies where a development/activity involves:

- * the clearing, removal or alteration of bushland;
- * works on land adjacent to National Parks, Nature Reserves, Bushland Parks, public open space (except playing fields or other open areas) or other bushland areas; or
- * disturbance to the habitat of endangered fauna.

Consequently, the policy applies to development and activities within the study area adjacent to National Parks and bushland areas. Under the policy, applicants are required to undertake a preliminary assessment of whether or not the habitat of protected fauna will be significantly affected by the proposal. If the assessment concludes that the proposal may significantly affect the habitat of protected fauna, a FIS is required to be lodged with Council.

Native fauna can also be adversely affected by the introduction of domestic pets, specifically cats and dogs. These domestic animals are known to attack and injure or kill native animals. In recent years there has been considerable debate on the effect of cats on native fauna and whether or not cats should be registered and desexed. A number of local Council's have introduced cat control strategies, including the Council's of Sherbrooke (Victoria), Ku-ring-gai, Lane Cove and Blue Mountains. Strategies for cat control and fauna protection include the registration, identification and desexing of cats, control of the movement of cats, the education of owners and general publicity of the problem.

As much of the study area is surrounded by Marramarra National Park, Berowra Valley Bushland Park and undisturbed crown land which contain pristine bushland and fauna, domestic pets should be kept under control and not allowed to roam through the bushland. Consideration should be given to the preparation and introduction of strategies for the control of pets within this area.

It is important that the terrestrial and aquatic fauna of the study area are considered in future planning strategies. Measures should be

introduced to ensure that the native fauna in the study area is not prejudiced by human interference.

4.8 Bush Fire Hazard

The villages and rural areas are surrounded by 235km² of natural bushland and the threat of bush fires is an important consideration. Each year bush fires in the Shire threaten life and property. As well as threatening human life and property, bush fires also destroy flora and fauna, although many Australian plants are dependent on bushfires for regeneration. Animals have adapted to a lesser extent and are often unable to protect themselves until the fire front has passed. The potential impact of bush fires should be considered as part of the planning process. Direction G20 under Section 117 of the Environmental Planning and Assessment Act, 1979, states, *inter alia*:

"In the preparation of a draft local environmental plan the Council shall take into consideration whether the land to which the draft plan applies is subject to bush fire hazard by reason of the vegetation on the land or on any adjacent land."

4.8.1 Bush Fire Threat

This section will address this requirement by examining the threat and measures to mitigate the threat. In the discussion document prepared by the Department of Bush Fire Services, entitled "Planning for Bush Fire Protection" (1991), the following considerations are listed as relevant in determining whether a bush fire hazard exists:

- * Are bush fires known to occur in the area and if so, to what size and extent?
- * Do the shrubs and grasses that form the understorey of the vegetation communities and hence the fuel bed, regularly dry out and burn readily?
- * Is the vegetation pattern such that extensive (rather than localised) native forests, woodlands or grasslands are found in the area (i.e. is it continuous)?
- * Are any gaps in native vegetation filled with pine plantations or crops?
- * Has recent development had little effect on the existing bush fire pattern?

- * Where the general fuel loadings are low or locally discontinuous, are aspect and slope likely to worsen the behaviour of any resultant bush fire?

Bush fires occur annually within the Study area. Council records indicate that 21 bush fires burning 106 km², have occurred within the study area between 1989 and the 1994 fire seasons (figure 4.6). The largest bush fire being the January 1994 fire which burnt 98km² between Wisemans Ferry/Maroota and Berowra Creek. This fire destroyed 4 houses and 3 sheds in the Canoelands area.

As indicated previously, the villages and rural areas are surrounded by 235km² of bushland. The open forests and woodland vegetation communities supply sufficient fuel for bush fires. Bush fires usually start near human access points such as the waters edge, road tracks and properties. The bush fires generally burn large areas and may take a number of days to extinguish due to the steep terrain, difficult access, bushland setting and the limited resources of the bush fire brigades. The fuel loadings within the bushland areas are generally moderate to high, due to the extensive natural bushland.

The area is served locally by the Arcadia, Dural, Cherrybrook, Glenhaven, Middle Dural, Galston, Glenorie, Canoelands, Kenthurst, Maroota and Wisemans Ferry Bush Fire Brigades which are community based organisations managed by Hornsby and Baulkham Hills Councils. During larger fires, brigades from other areas of the Shire and other local government areas may assist. The brigades also conduct hazard reduction operations between April and September to reduce the amount of available fuel and thereby reduce the threat and intensity of bush fires. The hazard reductions are conducted in a patchwork pattern to minimise the visual impact of burnt bush and the impact on flora and fauna.

These considerations indicate that the Study area is subject to a high bush fire threat especially to properties adjacent to bushland.

4.8.2 Mitigation Measures

The Department of Bush Fire Services Discussion document recommends that where a threat has been identified, the zoning, permitted land uses and development standards need to be appropriate for the hazard, and may include the following measures:

- * introduce landuse or zoning controls which avoid placing inappropriate development in hazardous areas;
- * provide for the creation of a Fire Protection Zone incorporating at minimum:
 - a 'Fuel Free Zone' bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for that development and a building line on the side of the development; and
 - a 'Fuel Reduction Zone' managed for hazard reduction and located on the bushland side of the perimeter road;
- * provide for two way road access which links to the fire trail network;
- * minimize the perimeter of the area of land which may be developed;
- * introduce controls on the placement of combustible materials within the fuel free zone.
- * introduce a requirement for dwellings to require development consent;
- * introduce setback controls;
- * introduce design and material controls;
- * introduce dwelling density controls;
- * introduce water supply requirements and landscaping requirements.

These types of measures should be included in a planning strategy for the area.

4.9 Air Quality

Air quality is often an issue that is overlooked until the quality deteriorates such that it affects health. In the 1970's, Sydney had a severe photochemical smog problem caused by vehicle and factory emissions. The improvements in vehicle fuel efficiency, tighter controls on exhaust and factory emissions reduced the problem (White, 1992). In May 1991, Sydney again experienced very high air pollution, caused by extensive bush fire hazard reduction burning within the Sydney basin (Niland, 1991).

Air quality and climatology modelling for the Sydney basin has found that there is a more significant air pollution problem in the western and south-western suburbs than in the Sydney CBD. On a typical high-pollution day, clean air flows into the Hawkesbury Basin from the south, pushing polluted air into the Parramatta Valley. The pollution follows the valley out to sea, however the pollution returns onshore with the afternoon sea breeze and concentrates in the Hawkesbury Valley around Camden, Campbelltown, Penrith and Windsor (White, 1992).

The study area and Hornsby Shire are less affected by the regional air pollution movements. The elevation of the Hornsby Plateau above the Cumberland Plain and the Parramatta Valley acts as a barrier preventing the polluted air moving through the region. As the study area is outside the high pollution areas, no air quality monitoring has been undertaken by the Environment Protection Authority within the study area. However, this does not mean that the study area does not suffer from air pollution or that development will not cause the deterioration of air quality.

Residents will be aware of the mornings when smoke from bushfires, bush fire hazard reductions and wood heaters, fills the valleys in the region like fog. Similarly, pollution from vehicles and industry can also be trapped in the valleys. As land use patterns within the Study area change, it is possible that the air quality of the area may also change. The impact of future development on air quality should be considered as part of any future strategy for the area.

4.10 Climatic Change

Scientific research during recent years has revealed that climatic change is another potential threat to the environment. The most debated issue is global warming or the rising temperature of the earth which is commonly referred to as the "Greenhouse Effect". The Greenhouse Effect occurs as a result of increasing concentrations of certain gases in the atmosphere. These gases trap heat energy given off by the earth's surface and include carbon dioxide, methane, nitrous oxide, ozone, water vapour and chlorofluorocarbons.

The Greenhouse Effect is a natural process that has occurred for millions of years, and has resulted in a mean global temperature of 15 degrees Celsius, some 35 degrees Celsius warmer than it would be otherwise (Love, 1992).

However, activity has increased the effect through industrial, transportation and agricultural activities which have increased the production of greenhouse gases. The net result of the increased production of the gases is greater concentrations of these gases in the atmosphere, allowing more heat to be trapped, leading to the rising temperatures.

Scientists use climate models to estimate the effect of the increased gases on the earth's climate. These models are being constantly refined as information and computer technology improves. The scientists also have to predict whether the production of greenhouse gases is going to remain constant or change. Consequently, a number of scenarios are used to predict the change and its effect.

The "Business as usual" scenario, which depicts a world in which few or no steps are taken to reduce greenhouse gas emission, estimates a global mean temperature rise from 1990 to 2030 of between 0.7 degrees Celsius and 1.5 degrees Celsius with a best estimate of 1.1 degrees Celsius. The estimate for 2060 is 1.6 - 3.5 degrees Celsius, with a best estimate of 2.4 degrees Celsius (Love, 1992). One of the effects of this rise in temperature is a rise in the global mean sea level of between 8 to 29cm, with a best estimate of 18cm, by 2030 and by 21 to 71cm, with a best estimate of 44cm, by 2075.

The effect that these mean global changes will have on south east Australia and the Hawkesbury River catchment are even more difficult to model and predict. Localised topography and proximity to water bodies will influence future climates as much as it does today. Sea level rise will have both direct and complementary consequences for Australia. Sea level rise will have a direct effect on coastal erosion with increased incidence of storm surges and other extremes accompanying high tides causing the most serious erosion. Sea level rise will result in flooding of coastal structures, shoreline change, saltwater intrusion into coastal lands, increased temporary flooding of coasts and changes in coral reef structures (Pitman 1992).

The sea level rise would be mirrored by a similar rise in coastal estuaries such as the Hawkesbury River. The rise would inundate low lying land and effect the draining of land. Increased storm activity would result in more frequent flooding and drainage lines being subject to greater volumes of water causing the problems effecting residential and commercial development and

waterway activities. Accordingly, Hornsby Shire Council needs to recognise the problems associated with the Greenhouse Effect and develop a policy or development standards to cater for the effects.

Research into the Greenhouse Effect and sea level rise is ongoing and models are continually being refined as information on the processes are learnt. Any strategy therefore needs to be flexible so it can be adjusted or modified based on further research.

Hornsby Council has introduced a policy on Greenhouse, addressing means to prevent the emission of greenhouse gases. This policy should be supplemented by the introduction of a minimum floor level for new development adjacent to the Hawkesbury River and Berowra Creek. The level would also have to consider high tides and floods. It would be appropriate to delay the consideration of measures to address the implications of sea level change due to the Greenhouse Effect, until the completion of the Hawkesbury Flood Study.

4.11 Natural Environment Conclusions

The natural environment provides opportunities and constraints for future development within the Study Area. Existing and future development within the Study area is constrained by areas of steep slopes, flora, fauna, severe erosion hazard, areas of poor land capability, bush fire hazards and proximity to National Parks and Nature Reserves. There are also areas of gentle slope, exhibiting good to moderate land capability and agricultural potential. The surrounding bushland provides an attractive setting and makes a valuable contribution to the area. An assessment of the visual environment of the Study area is provided in chapter 9 of this report.

The main geological units within the study area are the Hawkesbury Sandstone and the Wianamatta Group of shales, which do not impose major constraints to development and provide generally stable foundations. The area contains valuable extractive resources that should not be sterilised through inappropriate planning controls which permit incompatible land uses or prohibiting extractive industries and mines and floodplains.

Urban and agricultural activities should be encouraged on lands that have the appropriate soil landscapes and land capability and

development should be precluded where the soil landscapes is unsuitable.

Any development proposal or application for rezoning of land should be accompanied by soil and water management plans and an assessment be made of the extent of any previous soil contamination that may exist from agricultural or industrial activities. Land containing acid sulphate soils should not be drained or excavated. Lands identified as being prime agricultural lands should be protected from incompatible land uses.

The study area has a varied topography, including flat floodplains, rolling hills associated with shale geology and steep escarpments associated with the Hawkesbury Sandstone. Slopes greater than 20% are generally unsuitable for urban and agricultural activities and the constraints should be recognised by appropriate zonings. Design guidelines and development assessment criteria should be prepared for the construction of dwellings and addressing the limitations imposed by topography that need to be considered in assessing proposals, including techniques on limiting cut and fill construction.

Water quality within the study area especially within Berowra Creek has deteriorated as a consequence of rural and urban landuses. The source of pollution includes sewage treatment plants, septic discharges, earthworks, agricultural runoff, boating activities and urban runoff. All planning controls should consider the effect of development upon catchments, and as a consequence be based on a total catchment management framework.

The study area is located within the catchments of the Hawkesbury River, Berowra Creek and Marramarra Creek. The later two catchments represent natural land management units that are located entirely within Hornsby Shire. Consequently, Hornsby Council is able to adopt a Total Catchment Management approach to land use within these catchments.

The nominated flood level along the Hawkesbury River should be reviewed following the completion of the Public Works Department Hawkesbury Flood Study. It is also appropriate that a review of waste water disposal techniques be undertaken and include a program for encouraging water conservation techniques.

Where possible, all polluted waters should be collected and treated on-site to minimise impact

upon the water quality of groundwater supplies and water courses. Accordingly, it is appropriate that the water pollution and surveillance and monitoring program be continued and further developed. The program will allow identification and enable the implementation of a program of controlling pollutants at their source.

Seventeen soil landscapes occur within the study area. The soil landscapes vary in The study area contains extensive bushland areas within which 25 different vegetation communities and 18 rare or threatened species have been identified. Identified core bushland areas and fauna corridors should be preserved and protected from development. Flora communities B, E, H, I, J, K, M, N, P, R, S, W, X and Y have limited occurrence in the study area and controls should be developed to ensure their conservation. The zone boundaries of wetland vegetation communities should be reviewed having regard to the discrepancies identified between the existing zone boundaries and more recent investigations.

As the flora of the study areas is not comprehensively listed, any proposal that involves the clearing of bushland should be accompanied by a flora survey which includes a search for rare and threatened species. Where rare, threatened or endangered species are identified measures to protect the species should be considered and incorporated into the proposal. The impact of development upon bushland needs to be taken into consideration in any application and measures to reduce the impact be enforced.

The study area contains 388 native terrestrial vertebrate species, over 100,000 invertebrates and a variety of aquatic species including 90 species of fish. The best means to protect species is through the preservation of the habitat and the maintenance of fauna corridors. Native fauna is threatened largely by domestic animals which kill or injure native fauna. Steps should be taken to discourage the keeping of domestic animals and encourage the control of domestic animals in bushland areas.

The study area is subject to high bush fire threat as a consequence of the extensive bushland area and steep slopes. Land use strategies should be developed consistent with the bush fire hazard. Subdivision and building design standards and guidelines should be prepared to minimise the bush fire threat to life and property;

The study area has good air quality which deteriorates occasionally due to smoke from bushfires. In the assessment of development proposals and rezoning proposals the impact of permissible activities on air quality, including dust and atmospheric pollution, should be assessed where appropriate.

Climatic change is a potential threat to the environment and may result in sea level rise and therefore flooding along the Hawkesbury River. Hornsby Council's policy on Greenhouse should be further supported by revising floor level requirements for buildings along the Hawkesbury River to incorporate the impact of sea level rise due to the Greenhouse effect. This should be undertaken following the identification of flood levels being carried out by the Public Works Department.

CHAPTER FIVE - BUILT ENVIRONMENT

Over the past 200 years, European settlement has modified the natural environment and created a cultural environment with varying characteristics. These characteristics help define the nature of the rural area and the elements which coexist and/or impact on the natural environment. This chapter will examine the built environment within the rural and village areas. The characteristics that help define these two environments are the setting, land use pattern, subdivision pattern and built form.

5.1 Rural areas

The character of the rural parts of the study area has developed as a consequence of the relationship of the physical environment, land use, subdivision pattern and built form. The character within the area varies as the influence of the elements vary.

5.1.1 Setting

The natural environment of the study area has been described in detail in Chapter Four of this study. In summary, the land form varies from gentle sloping, cleared ridge top lands in the southern part of the study area to steeply sloping bush covered escarpments and valleys. Along the Hawkesbury River floodplains are located at the base of the steep bush covered valley sides. These generalised variations of the natural environment have influenced land use, subdivision and building techniques.

5.1.2 Land use

Historically, the land use patterns within the study area generally reflected topography, soil fertility, accessibility and water supply. The more fertile lands at Dural, Galston and along the Hawkesbury River floodplain were developed for agriculture, whilst the less fertile steep lands were retained as bushland. However, in recent times the dominance of agricultural activities within the study area has been reduced in favour of rural residential development. Agricultural production techniques have also changed, allowing lands less suitable for aquaculture to be farmed, including production which does not rely on soil such as hydroponics. Today, agricultural activities and housing compete for the available land. This can cause conflict as a consequence of the proximity of these uses.

Land use pattern

In the formulation of this study, a land use survey was undertaken by aerial photograph interpretation and site inspections. The dominant land uses within the study area were found to be agriculture, residential and bushland. Other uses include commercial activities, rural industries, home occupations, commercial fishing, mining, education establishments, community uses and recreation. The land use information generally depicts the non-residential use of properties. For example, if agriculture and a dwelling was observed, the agricultural use has been recorded, if no agriculture or other non-residential use was evident the property was classified as rural residential. Table 5.1, below, provides a summary of land use within the study area.

The pattern of land use varies throughout the study area. Figure 5.1 summarises the distribution of land use within the various localities. The figure indicates the vast area of bushland, the residential use of rural properties is more common in the southern portion of the study area and the location of horticulture establishments along the ridges associated with the more fertile soils.

Land use type and impacts

The development of different land uses can have both similar and different impacts on the natural environment. This section will briefly consider the impacts of the different types of land uses within the study area.

Agriculture: Agriculture within the study area consists of both intensive and extensive forms of production. Intensive agriculture includes the intensive stocking of land and the cultivation of flowers, vegetables and nursery plants. Extensive horticulture includes the cultivation of pasture, citrus and stone fruit trees. The animal production is generally a form of extensive agriculture but has been separated from horticulture for the analysis. Intensive agriculture occupies an area of 834ha, whereas extensive agriculture occupies an area of 593.5ha.

The use of cleared land for intensive and extensive horticultural activities can have a range of impacts including:

Table 5.1
Summary of land use

Land use	Area (ha)	No. of properties
Agricultural - intensive horticulture	834.0	332
Agriculture - extensive horticulture	593.5	228
Agriculture - animal production	337.5	128
Agriculture - pasture	360.0	144
Residential - village	67.2	559
Residential - rural	2,765.8	1,824
Commercial	169.5	66
Industrial	126.0	29
Community Uses	354.5	60
Bushland	24,766.0	515 (+ MMNP)
Recreation	170.0	25
Utility installations and reservations	24.0	17
Total	30,568ha	3,927

Note: MMNP = Marramarra National Park

(Source: Hornsby Shire Council)

- * the erosion of bare soil between crops;
- * deterioration of water quality in nearby watercourses through nutrient runoff and erosion;
- * soil contamination through the use of chemicals for pesticides, herbicides or weedicides, a residual component of which can remain in the soil;
- * degradation of the soil structure through ploughing or repeated cropping with the same crop;
- * increased salinity, through the reduction of plant transpiration which raises the watertable;
- * the use of fertilizer may cause odour pollution;
- * the use of glasshouses, tunnel houses and lighting at night can cause visual pollution; and
- * the use of air-conditioners and air-blowers on glasshouses can cause noise pollution.

Animal production, including poultry, livestock and horses, can have similar impacts to horticultural activities, although the cause may be different. The impacts include:

- * erosion of bare soil caused by overgrazing;
- * deterioration of water quality in nearby watercourses through nutrient runoff containing animal wastes;

- * degradation of the soil structure through the grazing of hooved animals; and
- * the amenity of adjoining residents may be affected through noise, odour and visual pollution.

Residential: Residential land use within the study is divided between the village and rural areas. The residential villages of Dural, Galston, Arcadia, Glenorie and Wisemans Ferry are discussed in more detail in Section 5.2 of this chapter. The density of dwellings in the rural areas reflects the minimum allotment sizes of 2 ha, south of Glenorie - Arcadia and 10 ha further north. In more recent times, rural properties have been utilised for the construction of large residential dwellings, with associated lawns, pools and tennis courts. These properties are generally referred to as Rural Residential.

The main impact of residential development in the rural areas is on water quality. Residential activities generate pollution which enters and affects the waterway. These activities include land clearing, earthworks, effluent disposal, termite control, spillages of paint, fuel or other chemicals and the use of fertilizers and herbicides.

Residential development, especially in the village areas, also increases the volume of runoff through increased impermeable surfaces. The increased

runoff may increase erosion within the watercourse or cause flooding.

Commercial: Commercial activities within the study area are concentrated at Dural Village, Dural Service Centre, Galston Village and the Wisemans Ferry Village. Additional commercial land uses occur within Baulkham Hills Shire at Round Corner, Dural Village, Glenorie Village and Wisemans Ferry. Scattered throughout the study area are a number of neighbourhood shops, service stations, retail nurseries, road side stalls and marinas, which also have a commercial function.

Commercial uses are generally undertaken in buildings and therefore have similar impacts to those described for residential development.

Industrial: The Dural Service Centre is the only land within the study area that is zoned to permit light industrial development. The Centre contains a mix of commercial, light industrial, warehouse, agricultural, recreation and residential uses. Throughout the study area, light industrial activities are conducted on rural properties under the definition of "home industry" or "rural industry". Rural industries are light industrial activities conducted by the residents within a building less than 50m² in size and which do not impact upon the amenity of the area. The industries should either process or package primary products produced in the area or service and repair agricultural machinery. This type of use includes packing sheds, value adding activities to agricultural activities and farm machinery repair enterprises. Sand and shale extractive industries are located at Canoelands and Maroota.

Industrial uses undertaken within buildings have similar impacts to those described for residential development, namely water quality and visual pollution. Industrial or manufacturing activities undertaken outside could lead to soil contamination through spillages of fuels or other chemicals. Additionally, industrial activities may cause dust, noise, water or odour pollution which can affect the amenity of nearby properties.

Bushland: The most extensive land use within the study area is natural bushland which covers 81% or 24,766ha. The bushland areas of Marramarra National Park, Berowra Valley Bushland Park, Dural State Forest, other Crown land and reserves form a significant habitat to fauna, a scenic resource and a local and regional

open space resource on the perimeter of the Sydney metropolitan area.

Bushland has the greatest coverage of any land use within the study area. Bushland can be affected by:

- * a different fire regime, both frequency and intensity, which can alter the composition of plant communities and can kill fauna;
- * the introduction of feral animals which can have a different impact on the flora and kill or compete with native fauna for resources;
- * weed invasion, where non-indigenous species compete with native species for resources;
- * the clearing of bushland for tracks, fire breaks and for other uses. The clearing reduces the habitat area for fauna, threatens the existence of some flora species and reduces the soil cover thereby increasing the opportunity for soil erosion. The increased soil erosion decreases water quality in nearby watercourses by increasing sediment and particulate matter loads which increases turbidity levels, smothers aquatic flora and transports other pollutants.

Aquaculture: Aquaculture consisting of oyster farming and fishing is undertaken in Berowra Creek and the lower Hawkesbury River. Land based activities associated with these waterway uses are concentrated at Wisemans Ferry, Spencer, Mooney Mooney and Brooklyn.

5.1.3 Subdivision pattern

The subdivision pattern of the rural area has developed as a function of the constraints of the physical environment and partially as a consequence of planning controls. Minimum allotment sizes were introduced in 1951, although much of the study area was already subdivided into 10 hectare allotments by this time. The current minimum allotment standards of 10 and 2 hectares within the Rural zones reflect the 1962 country dwelling standards.

The existing subdivision pattern can be described in terms of allotment shape and allotment size. This pattern will be a constraint for any future subdivision pattern which will also be influenced by subdivision approvals, potential for future subdivision and residents' aspirations.

Allotment shape

Allotments within the rural areas are typically rectangular in shape, indicating the regular subdivision of previously larger lots, including land grants. The rectangular subdivision pattern provides equal road frontage and a regular shape for lots. The subdivision pattern has evolved more through the want for regular shaped allotments than the assessment of land capability. Some lots within the study area have gentle sloping land zoned Rural separated by steep valleys zoned Environment Protection.

Allotment size

There are a total of 2,780 allotments within the rural part of the study area. Figure 5.2 summarises the distribution of allotment sizes in the rural area.

Figure 5.2 indicates that over 53% (1,480 lots) of allotments within the rural areas are between 2 and 4 ha in size and have an average lot size of 2.2ha. Twenty seven percent (770 lots) of allotments are less than the current minimum rural allotment size of 2ha. These lots may have been created prior to the adoption of the current standards or approved as being minor variations to the standard. There are 9% (276 lots) greater

than 10ha within the rural area. It should be noted that the data reflects allotment sizes and not zone boundaries which may affect the subdivision potential of land. Figure 5.3 details the lot size distribution for the different catchments.

Subdivision approvals and potential

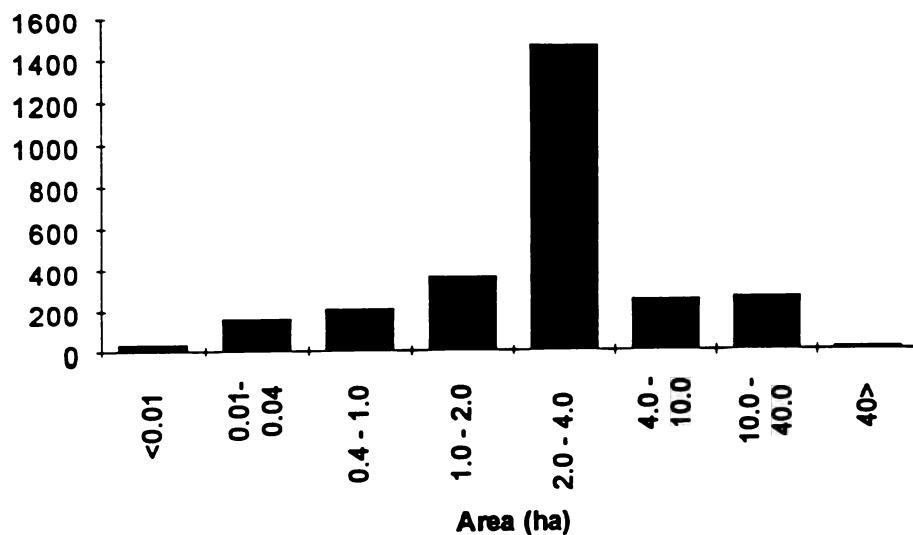
In the period from 1989 to June 1995, Hornsby Council has approved the subdivision of 27 rural allotments to create 100 allotments, and 4 residential allotments to create 14 allotments within the study area (table 5.2).

Table 5.2 indicates that the most number of lots approved were at Wisemans Ferry. With the exception of Wisemans Ferry and Arcadia, the subdivisions have generally been from 1 allotment into 2 or 3 allotments. At Arcadia, the subdivision of the Monastery land created 15 allotments and at Wisemans Ferry the subdivision of 3 allotments created 26 allotments.

Within the Village areas, 4 applications have been approved for the subdivision of land zoned Residential which created 13 allotments. A further application for the subdivision of a large parcel of land within Galston Village has not been determined.

Figure 5.2

Lot size distribution - rural lands



The creation of 100 allotments within the rural area and 13 allotments within the Village areas over 5 years represents a low rate of subdivision, an average of 20 rural allotments and 2.6 village allotments per year, respectively. There is limited opportunity for the further subdivision of existing properties zoned Rural A or B without a change in the minimum allotment size standard. Lot size analysis indicates that the average area of Rural A and B zoned land within an allotment is 5ha and 1.8ha, respectively. These averages indicate that a large number of allotments within the areas zoned Rural A have that portion of the property zoned Rural A, less than the minimum allotment size of 10ha.

As indicated in figure 5.2, there are few allotments greater than 4ha currently zoned Rural B and similarly few allotments greater than 20ha currently zoned Rural A, which could be subdivided.

The Study area contains 1,585.5ha of Crown Land zoned Rural A and 21.5ha of Crown Land zoned Rural B which could be subdivided, theoretically into 158, 10ha allotments and 10, 2ha allotments, respectively. Consequently, the rural areas have the potential to contain an additional 168 dwellings from the subdivision of Crown Land.

Residents' aspirations

The residents' survey sought opinions on the current subdivision standards and their aspirations for future possible subdivision. In terms of the existing subdivision standard, 57% of the total responses supported the current standards and 43% did not support the standards. Figure 5.4 depicts the responses on a locality basis and indicates that residents of Berribee, Fiddletown, Laughtondale and Maroota did not support the current subdivision standards.

In terms of the desired minimum allotment size, a comparison of the responses for each locality indicates a trend supporting the introduction of smaller allotment sizes with the majority of responses for each locality considering 2ha to be the appropriate standard (figure 5.5). However, a majority of residents from Canoelands and Wisemans Ferry considered that 10ha was more appropriate. The localities of Dural, Galston, Glenorie and Middle Dural had secondary response peaks within the 0.5ha category. Arcadia had two secondary response peaks at 10ha and 0.5ha.

Table 5.2
Subdivision approvals 1989-1995

Approved	Rural			Village		
	No. Applications	No. Lots	No. Lots Approved	No. Applications	No. Lots Subdivided	No. Lots Approved
Arcadia	3	3	19	1	1	5
Dural	6	7	18	-	-	-
Galston	6	6	17	3	3	9
Glenorie	5	5	13	-	-	-
Maroota	1	1	2	-	-	-
Wisemans Ferry	4	5	31	-	-	-
Sub total	25	27	100	4	4	14
Not determined						
Dural	1	1	5	-	-	-
Galston	-	-	-	1	1	14
Total (if approved)	26	28	105	5	5	28

(Source: Hornsby Shire Council)

Figure 5.4
Support existing subdivision standard

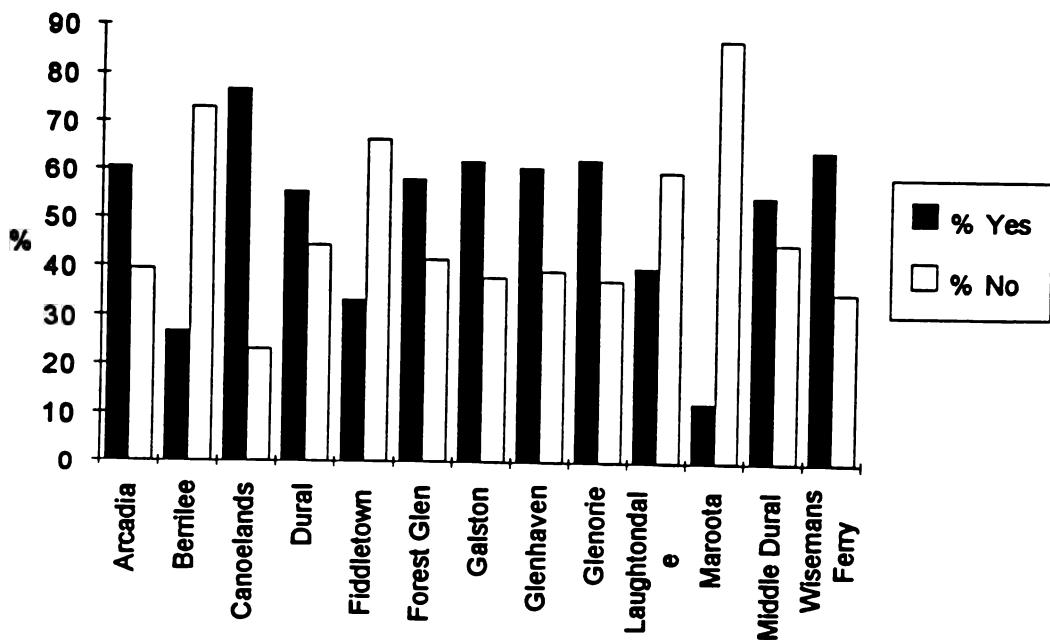
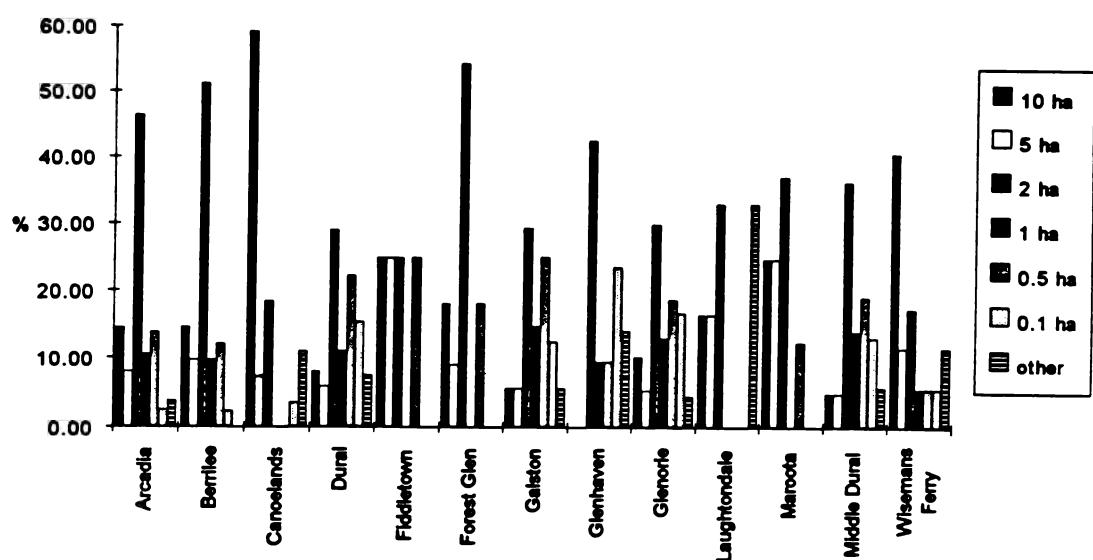


Figure 5.5
Desired minimum allotment size



5.1.4 Built form

Built form is the description of the general characteristics of the buildings and structures within an area. Elements that contribute to built form include design, colour, height, materials, outbuildings, setbacks and landscaping.

Residential dwellings are usually simple and traditional in shape. These dwellings are not homogenous in style, date or materials. The earliest structures are built from timber and stone, while in later periods fibro, weatherboard, asbestos cement and brick are evident. Corrugated iron and terra cotta tiles are used solely for roofing which may be constructed in hipped or skillion forms. Dwellings are usually well set back from the roads, although several older buildings are in close proximity to the roads as a consequence of road widening.

A variety of sheds and other structures are usually associated with past and current productive agricultural practices. The outbuildings are of traditional corrugated iron/steel cladding and hipped roofed. Traditionally, the outbuildings are in close proximity to the residential dwelling forming a cluster of buildings in the landscape.

The more recent residential dwellings of late 1980's and 1990's in the rural area have a different character. The dwellings are predominantly large two storey or elongated single storey, constructed of brick or rendered masonry with tiled hipped and/or gabled roofs. The dwellings are visually set in manicured landscaped gardens, with tennis courts and swimming pools. This style of development is especially evident in areas adjacent to the urban fringe, such as Dural, where the large dwellings have been placed in a landscaped rural setting. The dwellings usually face the road and can be surrounded by dominant masonry walls.

Outbuildings are usually constructed of the same materials as the main building and consist of garages and buildings associated with tennis courts and swimming pools. Agricultural outbuildings are typically isolated from the residential dwelling, creating the distinction between the work place and the home. Between 1993 and May, 1995, Hornsby Shire Council approved 36 Building Applications for agricultural and other non-habitable structures on rural properties. The proposed use of the structures approved included: stables, animal shelters, storage sheds, machinery sheds, produce packing and dispatch sheds, hot houses, garden

sheds and nursery sheds. The size of the structures varied from a 14m² garden shed to four 360m² greenhouses and a 640m² packing house. The average floor space of structures approved in 1993 and 1994 was 207m². Materials used in the structures approved included: colourbond metal cladding for both walls and roof, timber cladding, concrete, steel, plastic, zincalume and shade cloth.

Building consents issued by Council for structures not associated with agriculture or home / rural industries, were regularly conditioned to prohibit the use of the sheds for the purpose of any trade, industry or manufacturing activity which would contravene the planning provisions for the rural zones.

A rural workers' dwelling may be consented to be erected on a rural property where there is a bone-fide need for on-site assistance with the management of the agricultural activity. The erection of a rural workers' dwelling is an economic incentive for agricultural production, as it saves the cost of land purchase off-site. However, in recent years the genuine use of the rural workers' dwelling has been a matter of conjecture, with property owners seeking a second dwelling for rental purposes rather than to assist rural production and erecting dwellings that were larger than the principal dwelling.

In 1993, Hornsby Shire Council, in response to a number of applications for rural workers' dwellings, introduced a policy to provide more clear and strict guidelines for these dwellings. The policy was later incorporated into the HSLEP and the Rural Lands (Interim) DCP. A rural workers' dwelling is now defined as a moveable dwelling with a maximum gross floor area of 110m² and can be erected on a property where there is a genuine need for a rural worker to live on-site. This policy remains appropriate.

Distinct for rural workers' dwellings, second dwellings, are permitted within the Rural zones, if they are incorporated into the main dwelling to maintain the appearance of a single building. Prior to the gazettal of the HSLEP, which included these requirements, large second dwellings were constructed within the rural zones attached by a walkway or garage. The intent of the attached dwelling is to permit further housing opportunities for aged or young adults and rental accommodation within the area.

Attached housing provides alternative housing choices and additional housing opportunities

without promoting the population growth associated with conventional subdivision. The existing definition has overcome the problems associated with the size of the second dwelling and remains appropriate.

An outlet for agricultural produce has traditionally been the road-side stall, where produce grown on-site is sold to passing travellers. The stalls are traditionally simple shelters in which produce is displayed and sold on an informal or honour system. Produce sold is typically cut flowers, vegetables, fruit and manure. One of the attractions to visitors, and part of the character of the region, is the ability for visitors and residents to drive through the region buying produce from the farm gate.

Within Hornsby Shire, a number of road-side stalls have expanded to become shops in permanent structures, selling local produce, produce grown outside the region and other consumables. This created conflict and competition with fruit markets and grocers in the retail centres. To maintain the traditional concept of road-side stalls and the character of the area, Hornsby Shire Council introduced provisions in the HSLEP and Rural Lands (Interim) DCP. The provisions restrict stalls to be of a temporary character, not exceeding 20m² in floor space and selling produce grown on the property.

5.2 Village areas

The characteristics of the Villages within the study area are inherently different and have developed as a consequence of the relationship of the setting, land use, subdivision pattern and built form. This section will assess the character of the Villages of Dural, Galston, Arcadia, Glenorie and Wisemans Ferry and will review and identify the opportunities and constraints which may influence future development of the Villages.

Some of the characteristics of the Village areas are summarised in Table 5.3.

Table 5.3 indicates that the density of properties range from 2.2 to 10.6 lots per hectare, which is less than the urban areas of the Shire, where densities of 14 lots per hectare are common.

Within the Village areas the minimum allotment size of the Residential A zone is 500m², excluding accessways, which was introduced by the Hornsby Shire Local Environmental Plan in 1994. This standard is the same as that which applies to the majority of urban areas within Hornsby Shire. Between 1977 and 1994, the residential minimum allotment size for was 690m² for street front lots and 950m² for battleaxe lots.

Table 5.3 indicates that the average lot size of land zoned Residential A in Dural, Galston, Arcadia and Glenorie is greater than 1,000m², suggesting the potential for further subdivision. The development of these lands for multi-unit housing at a density of 1 dwelling per 350m², excluding accessway, could create further dwellings under existing provisions, however the subdivision of multi unit housing development will not be permitted. The following Village analysis will consider the subdivision potential in more detail.

5.2.1 Dural Village

Dural Village has developed linearly along Old Northern Road between Galston Road and Dural Public School. Old Northern Road divides the Village between Hornsby Shire Council and Baulkham Hills Shire Council. The Village area within Hornsby Shire, east along Old Northern Road consists of 36 properties zoned Residential A (Low Density).

Table 5.3
Village areas

Suburb	Area (ha)	No. properties	Density (lots per ha)	Ave. lot size (m ²)
Dural	7.36	51	6.9	1,443
Galston	37.30	325	8.7	1,148
Arcadia	4.14	9	2.2	4,600
Glenorie	16.70	156	9.3	1,071
Wisemans Ferry	1.70	18	10.6	944

(Source: Hornsby Shire Council)

In 1992, Hornsby Shire Council, in conjunction with Baulkham Hills Shire Council, prepared a planning study of the Dural Village Centre. The study recommended that the Village should continue to operate as a local centre as it had limited potential for the expansion of retail and business facilities. The study outlined the constraints and issues which needed to be addressed and provided a strategy to control future development in the Village. The strategy encouraged the development of a rural theme through the implementation of urban design controls for both private development and civic improvement projects. The findings and recommendations of the study have been embodied in a masterplan for the Village which is incorporated into the Dural Village Development Control Plan (DCP). The DCP has been recently reviewed and was adopted by Hornsby Council in May, 1995.

Land use

Dural Village contains a mix of land uses which generally reflect the rural character of the area, with allotments being developed for rural residential and agricultural purposes.

Rural residential allotments generally have frontage to Old Northern Road. On the eastern side of the road approaching Galston Road, residential development has been concentrated within the Village and is confined to the rear of the allotments.

The residential area fronting Old Northern Road, near Galston Road, incorporates a number of commercial, retail and industrial activities which rely on local and passing traffic for trade. A number of these activities do not conform to the objectives of the relevant zonings.

The lands fronting the western side, within Baulkham Hills Shire, are of a commercial and retail nature and include a nursery, restaurant, antique shop, car sales yard and shopping centre.

Subdivision

The general subdivision pattern of the properties fronting Old Northern Road within the Village is characterised by elongated allotments with east-west orientation, with depths of 100m and average area of 1,860m². The residential area along Galston Road maintains the 100m depth, however the lots are smaller (1,000 and 1,300m²) and have both east-west and north-south orientation. The Village area is surrounded by larger rectangular rural holdings which are generally 2 ha in size.

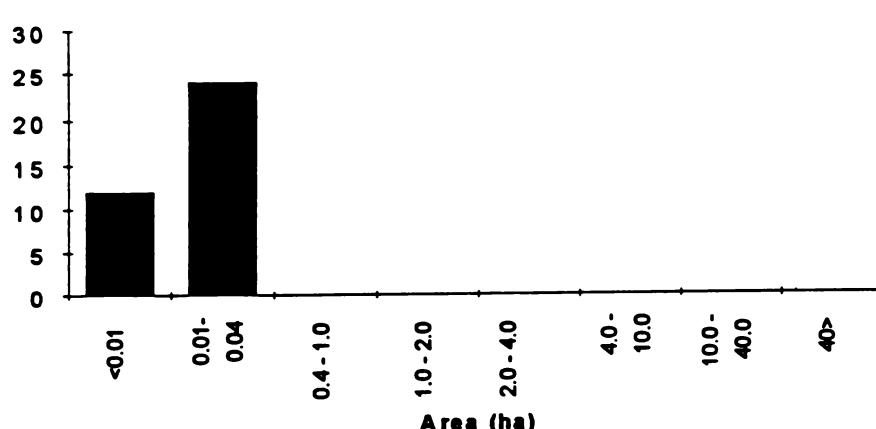
An analysis of the lot sizes in the residentially zoned area reveals that 66% of the properties are between 1,000m² and 4,000m² with the average of 1,600m² and the remaining 33 percent of the properties being less than 1,000m² with the average of 785m² (figure 5.6).

The lots greater than 1,000m² currently have the potential to be subdivided. It is possible for an additional 25 allotments to be created within the existing residentially zoned area.

Built Form

Architectural styles within the Village vary considerably. Commercial and retail buildings are broadly identified by flat roofs and dwelling houses by hip and gabled roofs. The unifying element of the Village is the low scale of development, with the majority of the built form being of single storey construction.

Figure 5.6
Dural Village - lot size analysis



Brick and concrete has been used extensively in the newer commercial and retail buildings as well as the residential houses in Galston Road. Steel roofs are common to the commercial/retail buildings, while terra cotta tiles are the predominant roofing materials for the residential buildings.

Development fronting the eastern side of Old Northern Road comprises an older residential area which has been partially redeveloped. The dwellings are fibro cement cottages of the 1940's and 1950's and generally have a setback of 7.6m (25ft) in accordance with past Council standards.

There are a number of heritage items in prominent locations within the Village which are features relating to the rural character of the area. These items include St Judes Anglican Church and grounds, a mid Victorian period Gothic style church with sandstone masonry walls and timber shingle roof; the former Wesleyan Church now an art gallery, a late Victorian period church with rendered walls, gabled iron roof and gabled entry porch; the Dural Memorial Hall; and four rural dwellings to the south of the Village. These earlier buildings, namely St Judes Anglican Church and the former Wesleyan Church, have setbacks less than 5m from the existing boundaries, as a consequence of road widening.

Issues

The Village has experienced a reduction in amenity over recent years due to the mix of existing activities and a general increase in traffic volumes on Old Northern Road. The high traffic volumes (18,000 vehicles per day) on the arterial roads lead to conflict between pedestrians and vehicles using the services provided in the Village. Retail, commercial and industrial land uses have reduced the residential/rural amenity of the area through the proliferation of signs and the number of vehicles entering and leaving the sites. The variety of setbacks on the properties fronting Old Northern Road and the lack of continuity in development further disjoint the image of the area. The Dural Village DCP incorporates planning strategies to address these issues and increase the amenity of the Dural Village.

5.2.2 Galston Village

Galston Village consists of 338 properties, the majority of which are zoned Residential A (low density). Eight properties are zoned Business C (Neighbourhood) and 3 Special Uses A (Community Purposes). Rural land surrounds the

Village and comprises predominantly orchards and nurseries.

The rural character of the area is apparent upon approach from Old Northern Road and along Galston Road, in contrast to the bushland setting of the Galston Gorge.

The Village core is defined with a close grouping of commercial activities along Galston Road stretching westward from Arcadia Road. The Village serves an existing Village population, the surrounding rural district and visitors to nurseries and attractions such as Fagan Park located north of the Village.

Land Use

The commercial activities act as a focal point for the Village. The Village has developed linearly along the Galston Road in an ad hoc manner and functions as a series of separate establishments which all have their own car parking areas.

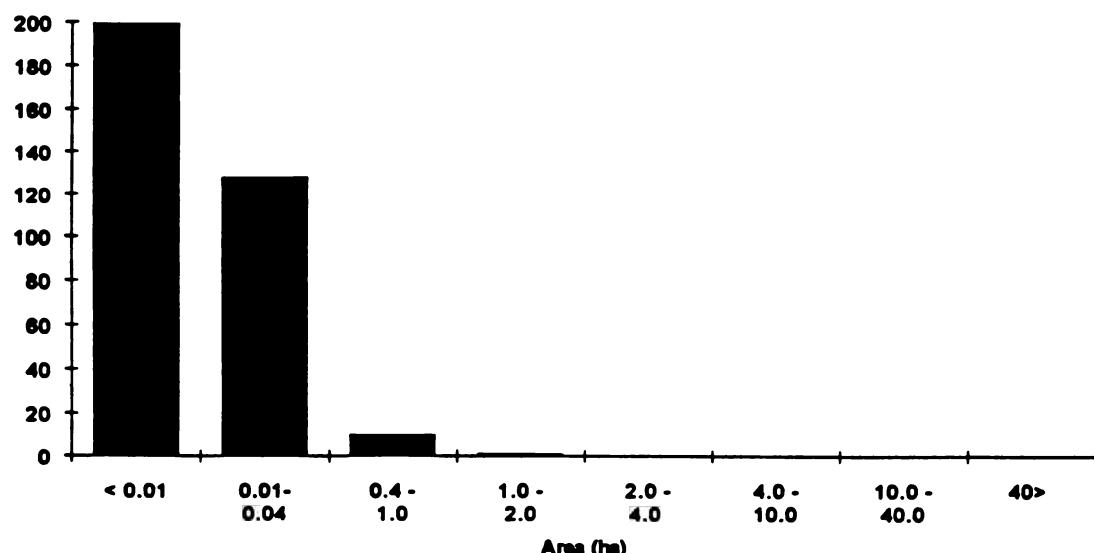
The main constituent of the Village is the residential component, bounded by Galston Road, Arcadia Road and Johnston Road, including a pocket of residential along Nancy Place.

Arcadia Road serves a number of community purposes, such as the Public School, Church, Community Hall, Health and Resource Centre and the RSL. Other community facilities such as Galston High School, Swimming Pool Centre, war memorial and ovals/recreational areas are located along Galston Road 1km south from the Village core.

Subdivision

The subdivision pattern has generally been dictated by the topography of the area. The original street pattern supported relatively large rural allotments that have been subdivided into residential allotments during the 1960's and 1970's (figure 5.7).

Fifty nine (199) percent of the properties are less than 1000 m² at an average of 840m² and further 38% (128) properties are between 1000m² and 4000m² at an average of 1316.2m² (figure 5.8). The one property larger than 1ha is Galston Public School.



Several roads including Sylvan Street, Hansen Avenue, Lackenwood Crescent and Nancy Place terminate in the area in readiness for key parcels of land to be subdivided to complete the principle of internal road networks formulated in the 1960's and 1970's.

Built form

The built form of the residential environment is characterised by detached single storey brick and tile construction with relatively generous front setbacks. Earth tone colours, verandahs and pergolas are common. A variety in the design of dwellings is apparent, although common themes exist in terms of bulk, building mass and roof design with hipped and gabled predominating. The dominance of free standing dwellings set in landscaped surrounds, provides a sense of openness in the residential environment.

Historical buildings within the Village reflect the simplistic rural character of the area such as the Community Centre along Arcadia Road, previously the School of Arts built in 1902. The community centre is a federation Gothic style brick building with buttresses and gabled iron roof. Additionally, Galston Public School, opened in 1886 is constructed of face brick walls, corrugated steel gabled roofing. The Galston library, previously the Emmanuel Church of England, is an inter-war gothic style church, constructed in 1938 utilising simple face brick and corrugated iron gabled roof.

Issues

The main planning issues facing Galston Village relate to the commercial area. The existing shops function as a series of separate establishments rather than as an integrated village core, which is particularly evident by the separate car parking areas. The opportunity exists to improve the character and identity of the commercial area through the development of an overall scheme to provide a village core.

5.2.3 Glenorie Village

The Glenorie Village is located along the ridge that follows Old Northern Road servicing the Wisemans Ferry and Hawkesbury Valley areas. The Village is characterised by its setting of rural scenery with natural "backdrops" of bushland.

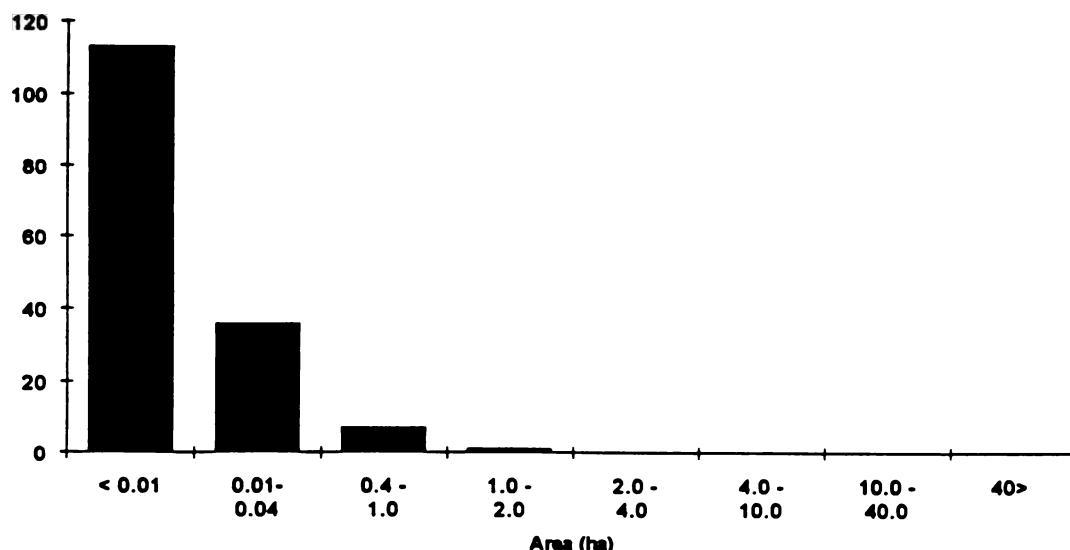
The Village is divided by the traffic corridor of Old Northern Road which separates the community uses and the residential component of the Village located within Hornsby Shire, from the ribbon development of retail activities, located within Baulkham Hills.

Land use

Glenorie consists of 157 properties which are zoned Residential A (Low Density). The surrounding rural land is predominantly orchards. Community facilities such as Glenorie Public School, the Community Hall and the Bushfire

Brigade are located on Old Northern Road providing services to the surrounding rural area.

Figure 5.9
Glenorie Village - lot size analysis



There are significant open space areas within the Village such as Glenorie Park, Glenorie Oval and a playground area nestled behind the residential allotments on Tekapo Road and Wirra Place. Additionally, areas of native vegetation have been maintained within the residential area providing a bushland setting.

Subdivision

Glenorie's residential environment is characteristic of urban release areas of the mid 1970's including a curvaceous street pattern with cul-de-sacs that serve regular shaped allotments of 700m² accommodating detached dwellings.

Land east of the public school was subdivided for residential purposes in 1976, and land to the north was subdivided in 1977. The subdivision allowed the Department of Education to extend the public school's eastern boundary by acquisition of land.

Seventy two percent of the properties within the Village are less than 1,000m², averaging 955m². A further 23% of the properties are between 1,000m² and 4,000m², averaging 1235m² (figure 5.9).

Built Form

The majority of residential dwellings are of brick and tile construction, and predominantly of single storey height. Earthtone colours, decks, verandahs

and pergolas are common, particularly in relationship to the bushland setting. The character of the built environment is a result of the conditions applied to the development of the dwellings. The streetscape is open, created by a road setback of generally 9m and an absence of front fences. The vegetated road reserves fronting Old Northern Road act as a buffer from traffic noise to the residential areas, typical of residential development of the mid 1970's.

Along Old Northern Road, the character of the area is strengthened by a number of historical buildings. The Glenorie Memorial Hall dates back to 1932. The Inter-war community hall has a symmetrical composition and is constructed of dichromatic brick walls, simple gabled roof form with a parapet gabled entry porch. Additionally, the former church, now a converted retail business, is of Federation Gothic style constructed of weatherboard and fibro cladding. There are also several rural cottages within the Village that are constructed of weatherboard, displaying hipped iron roofs and verandahs.

The Public School consists of single storey buildings with the exception of one, two storey building. Additions to the school were commenced in 1978. Part of the school property is reserved as natural area.

Issues

An opportunity exists to strengthen the rural/bushland character through minor civic improvements to enhance the amenity of the Village. The civic improvements should be coordinated to ensure that the approach of both Councils achieves a cohesive village character.

Along Old Northern Road outside the Public School there is no definition of pedestrian and vehicular access and consideration should be given to define these areas.

Upon approach to Glenorie there is no sense of entry to the Village and no indications of arrival to the Village. Appropriate landscaping and signage reflecting the rural character of the area could be located in strategic locations within the Village.

5.2.4 Wisemans Ferry Village

Wisemans Ferry Village is located on the largest low lying promontory of the Hawkesbury River at its junction with the MacDonald River. The small urban Village is confined to a cluster of buildings which straddles a gentle slope below the enclosing steep sandstone escarpments and above the flood liable river flats. The pattern of European settlement is largely dictated by the characteristics of the natural environment. The Village lies on the boundary of Hornsby and Baulkham Hills Shires, with Hornsby Shire lying to the east of Old Northern Road. Within Hornsby Shire there are 23 properties which are zoned Residential A, Business C or Environmental Protection.

The Village demonstrates all phases of its history, from an important river crossing settlement, a rural service centre, orchards, recreation and now tourism. Of particular importance is the evidence the Village contains of early convict works associated with the building of the Great North Road.

A study of the area has recently been prepared by both Councils, with the assistance of a grant from the 1993 National Estate Grants Program (Moore et al 1994). The study included a historical investigation, assessment of the Village and recommendations for its future. The study developed design guidelines and incorporated principles for landscaping and for the siting, size, shape and materials of new development within the Village.

Land Use

The Village supports commercial and recreational activities and an increasingly wide range of tourist oriented activities. The main features of the Village are the hotel, shopping centre, recreational areas and the ferries. The hotel and most of the shops lie within Hornsby Shire and are currently zoned Business C. These buildings are generally of a much greater scale and appear to be the most significant buildings in the Village, though not the most visually dominant.

The river flats wrap around the end of the promontory which includes the public reserve and playing fields, golf course, a disused orchard and grazing land. The public reserve is largely open grassland with gravel carparking areas, scattered barbecues, seating/tables and play equipment.

To the east of the Village, along Singleton Road, is an area zoned residential which has been subdivided into 19 properties, the majority of which contain a single dwelling.

Subdivision

The 18 residential properties along Singleton Road have an average area of 944m². The land occupied by the Wisemans Ferry Inn and the Bowling Club are between 4,000m² and 1ha in size and the two allotments greater than 4ha are the land occupied by the oval and community centre (figure 5.10). The land occupied by the community centre extends to the rear of the shops and has the potential to be subdivided into 25 allotments of 1,000m², above the flood line.

Built Form

The buildings in the Village cluster make an important contribution to the character of the area, particularly those of heritage significance. The placement of the buildings reflects the subdivision of the Village and the constraining influences of topography and services. Existing buildings are small in scale and built close to the street, simple and traditional in shape, and comprise gable, hipped or skillion roofed elements, often in distinctive combinations. The buildings are not homogenous in style, date or materials. The earlier structures, such as the church, are built from timber and sandstone, while later structures were built in brick, fibro and steel cladding. The character of the Village is directly shaped by the limited amount of materials used in the familiar vernacular form of the buildings.

Heritage Items such as the Wisemans Inn contribute to the ambience of the Village. The hotel is a two storey Victorian Filigree style hotel built around the Old Colonial Georgian original building dating back to 1826. Of rendered masonry construction, corrugated iron roof and a timber verandah, it was the original home of Solomon Wiseman. Mature Hills Figs planted in the 1950's shades the western facade of the Inn and obscures the building.

Recent buildings have been obvious introductions to the area. The new Wisemans Ferry store adopted the simple traditional materials approach, using steel roof with weatherboards and open verandahs. Similarly, any development should be consistent with the casual, loose edged nature of the older development in the Village.

The dwellings in the residential subdivision on the southern side of Singleton Road are very different in appearance and character. The dwellings are constructed of pole or frame construction to adapt to the steep slopes and are partially camouflaged by the upper tree growth. Accessways intrude on the streetscape as they have been cut into the steep slopes and stabilised by concrete surfaces.

A new residential subdivision further along Singleton Road, has been undertaken on the lowest slopes of the escarpment. The blocks are steep and any development of buildings and driveways will inevitably lead to the removal of

some vegetation and modification to the landform. These areas are visible from the road and from the river and require particular attention in the context of the visual qualities of the area.

Issues

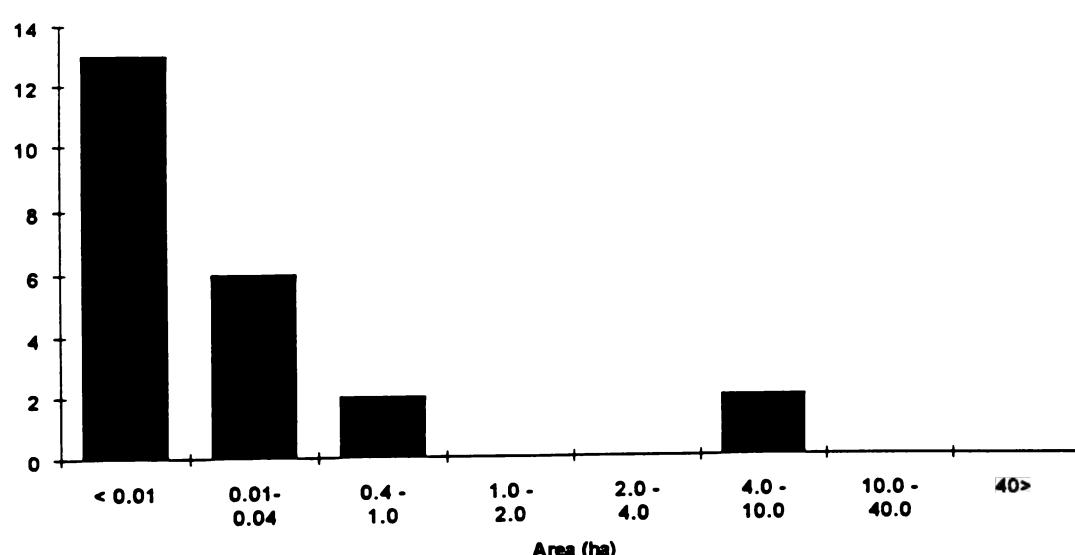
The Village lacks visual cohesion because of the different approaches by the two Councils to public street furniture, bins, street planting and public landscaping. The recent study has identified this lack of co-ordination and the need for a unified approach to the Village.

The physical constraints of the area limits opportunities for the expansion of the Village. Development within the Village is restricted to the redevelopment of existing structures or the development of the two vacant lots on River Road, close to Webb Creek Ferry and the land between the Community Centre and the Village store.

There is no definition between pedestrian and vehicular access and there is the absence of visual links between the Village core and the two ferries. The River Road landing lacks definition and is visually cluttered.

The playing fields on the eastern side of River Road are devoid of vegetation which does not encourage visitors or allow the differentiation between playing fields and passive recreation areas.

Figure 5.10
Wisemans Ferry - lot size analysis



Signage is intrusive on the Village townscape and detracts from the appearance of the Village, especially the approach to the Village from Old Northern Road and from the ferry. The removal of advertising signage that does not conform to Council's Outdoor Advertising Development Control Plan and the rationalisation of the number of RTA signs should be considered.

5.3 Built Environment Conclusions

The existing character of the rural and village areas has developed as a function of the natural environment, landuse, subdivision pattern and the built form.

The dominant land use within the study area is bushland, primarily because of the large area of Marramarra National Park, Berowra Valley Bushland Park and Crown Land. Land use within the rural areas has changed from a strictly agricultural district. Today, a greater number of properties within the rural areas are used for a residential rather than a rural use. In the coming years this trend is likely to continue as a result of an increasing demand for rural properties to be used for residential usage.

Subdivision size distribution within the rural areas is dominated by allotments within the 2ha to 4ha range and within the Village areas by allotments of approximately 1000m². The Village areas do not provide a range of allotment sizes to accommodate different housing choices.

The built form of the rural areas is changing within the increased residential use of rural properties. Larger houses of an urban character are being constructed as opposed to the traditional more modest rural dwelling. These dwellings and the change of land use are changing the character of the rural areas.

The built form of the Village areas generally reflects 1960's and 1970's subdivision and construction. The Villages, especially the commercial precincts, have developed in an ad hoc manner. Thematic landscaping including street trees and feature planting should be encouraged to improve the identity and character of the village areas. This could be achieved through the preparation of Village concept or masterplans.

CHAPTER SIX - ECONOMIC ENVIRONMENT

The study area features a diverse economic environment with input from agricultural production, retailing, aquaculture, tourism and rural industries. While the forces that influence the broader economy have an influence on economic activity within the study area, the most direct influence is the local population and local planning controls which regulate the extent of economic activity in the area. Accordingly, in the formulation of any planning strategy for the study area it is necessary to consider the economic environment and the planning controls which can influence it. The following discussion provides an evaluation of employment, agricultural production, aquaculture, retailing, tourism and rural industries within the area. The study area also contains valuable extractive resources of sandstone, and shale on the surface and coal and petroleum resources some 700m below the surface. These resources were previously discussed in Chapter 4.1.2 and are the subject of a comprehensive Management Plan and Draft Development Control Plan for Extractive Industries. Accordingly, while this resource provides an economic input to the area, it will not be addressed in this report.

6.1 Employment

One contributor to the economic vitality of an area is its employment characteristics. If residents maintain an income from employment they are more able to spend money in the local area, which assists other businesses and their employees. Population and employment characteristics are appropriate considerations in the preparation of planning strategies and the assessment of social needs. Relevant in the assessment of employment characteristics are labour force characteristics, occupations and employment opportunities.

Labour force characteristics

At the time of the 1991 Census, the population of the study area was 9,290. Of the total population, 6,906 persons were aged 15 years or more which is the threshold for inclusion in the employment statistics. Of the persons aged 15 years or more, 4,764 persons were considered as being in the labour force (4,518 employed and 246 unemployed persons). A further 2,142 persons were not seeking employment (ABS, 1993).

The labour force participation rate of 4,764 persons represents 67% of the workforce in the study area which is marginally greater than the average for the Shire. The labour force comprised 2,737 males (57.5%) and 2,027 females (42.5%).

Labour force participation rates generally increase with age for both sexes. Amongst 15 to 19 year olds, the labour force participation rate was 42% which is 2% below the average rate for the Shire and 4.5% lower than the average for Sydney. This lower rate most likely reflects the propensity of 15 - 19 year olds within the study area to pursue further education as a means of obtaining employment. The participation rate for 20 to 24 year olds in the study area increases to 82% which is equivalent to both the Hornsby Shire average and Sydney average (ABS, 1993). These figures highlight the increasing participation rates for persons over 20 years of age who have completed their further education and are obtaining work. Unemployment levels were lowest in the 45-54 year old age group at 2.2% which is below the average in this age group for the Shire at 3.2% and for the Sydney Region at 7.2%.

The 1991 Census indicates that an average of 21% of persons in most age groups in the study area work part-time. This figure reflects the characteristics of households in the rural areas of the Shire and demonstrates the need for spouses to supplement household income and for young people to undertake part-time work while undertaking further education or seeking permanent employment. Generally, females were more likely to be employed in part time work (19%) than males (9%). This is consistent with the trend for females to enter part-time employment on the commencement of their children's primary school education. The proportion of males in part-time employment in the 55 years plus age group is 21%, which reflects the propensity for many semi-retired people to supplement their income (ABS, 1993).

The above assessment indicates that there is not a comparable unemployment problem, in any age group within the rural areas of the Shire. Additionally the marginally higher than average work force participation rates are reflected in favourable household income levels.

Occupation

Occupations within an area can provide a measure of the economic vitality and available spending. An indication of occupations within

the study area can be obtained from the 1991 residential census and residential survey. The 1991 Census indicates that the largest employment sector for residents in the rural areas is the wholesale and retail sector which comprises 24% of the workforce. This is followed by community services (17%) and finance, property and business services (13%), agriculture (8.6%), manufacturing (8.6%) and construction jobs (8.6%) (ABS, 1993).

Reflecting a general trend, the largest employment sector for young people is in wholesaling and retailing, which employed 39% (or 140) of 15-19 year olds. Sectors of employment vary between genders with 60% of workers in the wholesale and retail sector being males and 67% of workers in community services being female.

The 1991 Census indicates that there is a low proportion of persons with university qualifications in the Study Area (7%). Persons employed in the white collar sector comprise managers or administrators (21%, or 952 persons), clerks (15%), professionals (14%) and tradespersons (13%). Places of work are generally located outside the study area, with only 833 persons (18%) in the labour force working locally (ABS, 1993).

Thirty three percent (33%) of the responses to the resident survey undertaken as part of this study indicated that part of the household income was generated from the property. Figure 6.1 illustrates the responses from each of the locations within the study area. Only in the localities of Canoelands, Fiddletown and Forest Glen, were the number of responses indicating household income generated from the property greater than household income generated from elsewhere. In the Laughtondale and Maroota districts, responses indicated an almost even distribution between the generation of household incomes from the property and external sources. Household income in all other rural areas was principally generated from sources other than the property.

In respect of the occupations undertaken on rural properties, 72% indicated agricultural use, 16% office use and 7% manufacturing or industrial use (as indicated in Figure 6.2). Of the agricultural uses, 45% of the responses indicated intensive horticulture (consisting of approximately 15% of each of flowers, vegetables and nurseries) 33% extensive horticulture (orchards) and 23% livestock. Office uses include accountants, architects, printers and various consultants. Other uses indicated in the responses include accommodation, tradespersons, cottage industries and cat and dog boarding.

Figure 6.1
Income generated from property

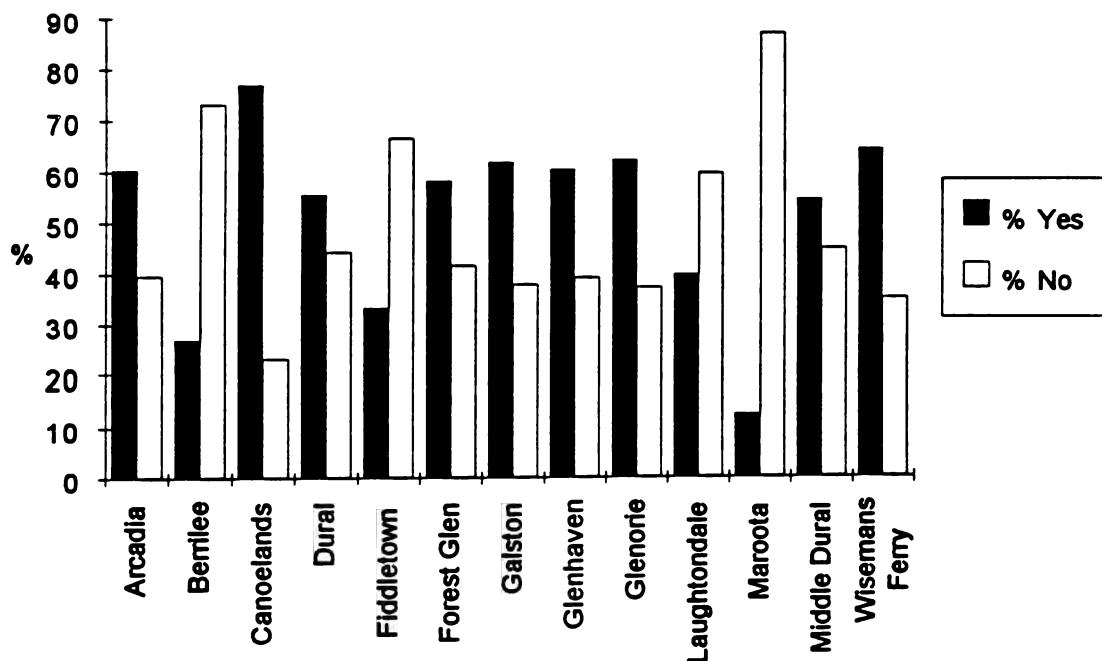
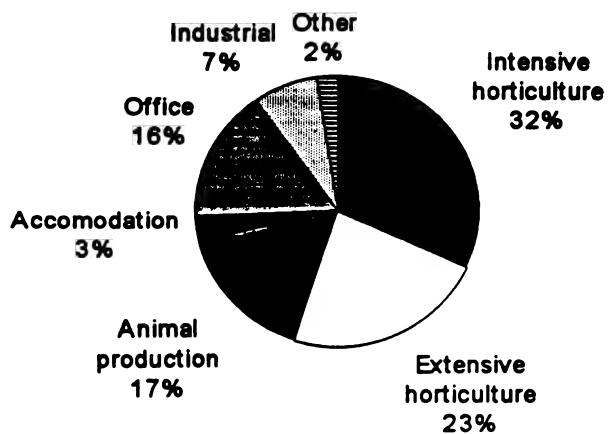


Figure 6.2
Occupation undertaken on property

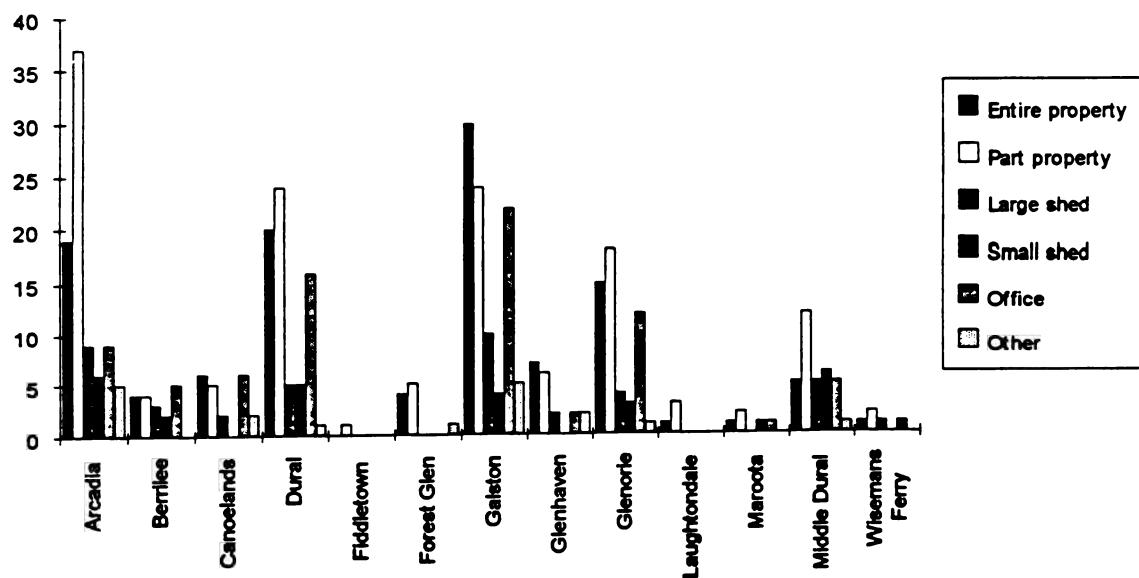


Of the 426 respondents who indicated that their property was used to generate some part of the household income, 27% indicated that the entire property was used, 34% indicated part of the property, 19% used an office, and 16% used sheds (Figure 6.3).

Survey responses indicate that 718 permanent and 341 non-permanent persons were employed within the study area. The majority of these were employed in the localities of Dural and Galston within agricultural enterprises. The non-permanent employees were generally engaged during the summer picking seasons.

Employment in the agricultural sector of the Shire can be broken into two components, full-time and part-time. ABS census data (1991) indicates that 8.8% of the rural land's workforce is engaged in agriculture, representing the fourth highest occupation sector in the rural area. Given the often seasonal and variable nature of agriculture, there is a large part-time workforce. This workforce is employed in the picking of fruit, harvesting of vegetables and other produce, which are all seasonal activities requiring a pool of flexible part-time workers.

Figure 6.3
Proportion of property



The above assessment indicates that agricultural and home based activities provide employment and contribute to household income within the study area. The nature and extent of these activities varies throughout the rural areas. It is important that any strategy recognises these components in order to promote employment opportunities.

Future employment opportunities

There is a correlation between population growth and existing and potential employment opportunities within the study area. Specifically, increases in population lead to increases in demand for goods and services, which in turn leads to employment opportunities.

Traditionally, employment opportunities within the study area have lagged behind population increases. The imbalance between population growth and employment opportunities has led to a large proportion of persons being employed outside the study area.

Employment dispersal in the northern and western areas of Sydney will continue to affect employment opportunities within the study area. District, Sub-regional and Regional centres such as Castle Hill, Hornsby, Parramatta, Chatswood and North Sydney will continue to provide the greatest levels of employment for residents. Similarly, expansion of the north west sector development and further development within the Dural Service Centre will provide additional employment opportunities.

There are a number of key factors that will impact upon future employment opportunities in the vicinity of the study area. These factors include:

- * the attraction of the Northwest Business Park and the Castle Hill Technology Park, which will provide employment opportunities in a variety of employment sectors and an incentive for people to either stay or locate within the study area;
- * the provision of service / light industrial activities within the Dural Service Centre;
- * increases in white collar tertiary employment, providing additional management positions;

- * the relocation of government offices to sub-regional centres, increasing employment opportunities for administrative positions;
- * the development of the north west sector, providing opportunities for construction, educational and commercial positions;
- * the potential for growth in the tourist industry in the rural lands, providing opportunities for tourism and service industry positions; and
- * an ageing population, increasing demand for the provision of services and facilities for the aged which will provide employment opportunities for health care workers.

6.2 Agricultural production

Agriculture, the cultivation of land and stock-raising, is paramount for the day to day needs of the broad community. Agriculture supplies vegetables, fruit, poultry, dairy, fish and meat products for consumption, to both local and international markets. Other forms of agriculture such as cut flower production, wool production, cotton, nurseries, turf farms and horse breeding are equally important to the population and the economy.

Sydney's large population means that it has a large market for fresh produce. The fragility and perishability of much of the fresh produce makes it essential to have quick access to the markets so that it reaches the consumers fresh. This market proximity means that producers can take their own products to the markets and thus do not need to employ agents or carriers for market delivery.

Agriculture is a highly integrated industry. The Poultry Industry and market gardens are a good example of this. The market gardens utilise the poultry manure as fertiliser. Poultry also utilises wood shavings for the floors of the sheds. Accordingly, there are benefits for the integration of different agricultural practices. The wastes from one practice become the raw materials for another. This linkage is broken when one industry is forced to relocate to another geographic area.

Hornsby Shire has a rich agricultural heritage with many of the current residential areas at the one time being orchards and farms. For example, Galston at the turn of the century was the

dominant supplier of citrus fruits in NSW. The Fagan family was reported to have exported mandarins to New Zealand (Geelan, 1986). The value of agriculture production within the Shire has not been previously considered. Prior to considering agricultural production in Hornsby Shire, it is worthwhile to consider agricultural production in the Sydney Region.

6.2.1 Sydney Region

The Sydney Region is one of the most productive agricultural regions in New South Wales. NSW Agriculture estimates the annual gross value of production is at least \$1 billion, with flow-on effects to the economy of \$2-3 billion (NSW Agriculture, 1995).

This estimate is more than twice that calculated by the Australian Bureau of Statistics (ABS). ABS estimated that the 1990-91 farm gate value of agriculture produce originating from the Sydney Region to be \$461 million, which represents 7% of the total NSW production. The ABS data includes only those producers with a farm gate value exceeding \$22,500 and relies on the property owner submitting a return.

For this same period, NSW Agriculture estimated the farm gate value of production for the Sydney Region to be \$850 million. This estimate is based on the biennial horticultural field survey and industry estimates, made by NSW Agriculture Advisory Officers (Kennedy, 1993). The current estimate of \$1 billion takes into account inflationary factors since 1991; revised industry estimates, principally for Chinese vegetables and the mushroom industry; and studies of several discrete parts of the region which indicate a higher degree of productivity than was previously acknowledged.

The NSW Agriculture estimate for the Sydney Region cannot be compared with ABS figures for New South Wales due to the different data collection methods. Consequently, NSW Agriculture cannot accurately estimate the contribution made by the Sydney Region to the State total. However, it is likely to be considerably higher than 7%.

Production within the Sydney Region occurs mainly in the Local Government areas located on the fringe of the region, namely Bankstown, Baulkham Hills, Blacktown, Blue Mountains, Camden, Campbelltown, Fairfield, Gosford, Hawkesbury, Liverpool, Penrith, Warringah, Wollondilly, Wyong and Hornsby.

A detailed analysis of 1990-91 ABS regional agricultural production in NSW and the Sydney Region was undertaken by Wollondilly Shire Council, as part of the preparation of their Agricultural Lands Study (1993). The following summary of the Sydney Region is extracted from the Wollondilly Agricultural Lands Study (Wollondilly Shire Council, 1993).

"Agriculture in the Sydney Region is generally intensive with poultry production, vegetables, stone fruit, cut flowers, nurseries and turf farms being the dominant forms. In terms of vegetable production, the Murrumbidgee (33.12%), Murray (23.82%) and Central West (13.42%) regions produce more than the Sydney region (8.22%). However, in terms of perishable commodities, such as lettuces, mushrooms, spinach, spring onions and fresh tomatoes, the Sydney Region produces between 40 and 95% of these vegetables. This indicates that vegetables grown in other districts are generally canned or frozen, whereas fresh vegetables are grown in Sydney close to market."

Similarly, nurseries, cut flowers and turf farms are also market orientated produces and the majority are located within the Sydney Region.

The Sydney Region produces 8.82% of NSW's citrus fruits, 12.27% of stone fruit and 16.24% of berry production. This production is significant as it is for the fresh food market whereas citrus grown in the other region's is processed for juice, canning or dried fruit.

Poultry production in NSW includes chickens, ducks and turkeys for meat and egg production. The Sydney region produces 61.2% of poultry production, 60.6% of chickens for meat production, 59.43% of duck production, 46.26% of turkey production and 38.63% of egg production within the State.

In terms of livestock production in NSW, the Sydney region is not a dominant producer of cattle, sheep, horses, goats, deer or pigs" (Wollondilly Shire Council, 1993).

The Wollondilly Agricultural Lands Study drew heavily on the ABS Statistics of 1990-91. However, this would tend to lead to an underestimate of production, as indicated by the

much higher estimate of NSW Agriculture. The underestimate is likely to be perpetuated in ABS agricultural production data for subsequent years.

Despite their inaccuracies, the 1992-93 ABS agricultural production statistics for Hornsby Shire and the Sydney Region have been compared as part of this study, and are summarised in Appendix G. It should be remembered that as with the Wollondilly analysis, the ABS statistics only consider farm gate values in excess of \$22,500.

6.2.2 Hornsby Shire

To attempt a more complete analysis of existing agricultural value and practice within Hornsby Shire, three other sources of information were considered, namely; the farmland rating returns, land use survey, and an agricultural production survey undertaken in the preparation of this study by officers of NSW Agriculture.

Farmland rating return

Within the rural area, land is rated as 'Residential - rural'. However rates can be reduced if the dominant use is farmland. Under the Local Government Act, 1993, (section 515) land may be categorised as "farmland" if it is a parcel of ratable land and its dominant use is for farming. Farming is described as the business or industry of grazing, animal feedlots, dairying, pig-farming, poultry farming, viticulture, orcharding, bee keeping, horticulture, vegetable growing, the growing of crops of any kind, forestry, oyster farming, or fish farming, or any combination of those businesses or industries, which:

- has a significant and substantial commercial purpose or character; and
- is engaged in for the purpose of profit on a continuous or repetitive basis (whether or not a profit is actually made).

If an owner demonstrates to Council that farming satisfies the above criteria, rates on the property are reduced by 50%. In 1994, Council approved farmland rating for 430 properties.

The farmland returns provide a more complete source of information than the ABS survey, as there is a financial incentive to return the form and properties with a farm gate value of less than \$22,500 are considered. By comparison, 430 properties received a farmland rating, representing 306 additional properties to those recorded in the ABS data. Notwithstanding, the

information submitted varies in quality and the range of methodologies and variables in the returns indicates that the data is not completely accurate. Table 6.1, is a summary of agricultural production based on the farmland returns, it being noted that a mixture of activities can occur on the one property.

Land use survey

Table 5.1 (chapter 5) indicates that a total of 688 properties covering an area of 1,765ha were identified as being partially or entirely used for agricultural production. Whilst, some properties may only be partially used for agricultural production, the number of properties involved in agricultural production is 258 more than the number provided with farmland rating and 564 more than the ABS data, suggesting that agriculture is more widespread than identified by the other two data sets.

Agricultural production survey

As part of this study an Agricultural Production Survey was undertaken by NSW Agriculture (Appendix H). The survey was undertaken by specialist advisory officers of NSW Agriculture with knowledge of the area. This included horticulturists specialising in cut flowers, vegetables and fruit, the district agronomist, the regional poultry officer and the agricultural environment officer.

The survey was restricted to estimates of the gross value of production. It was also agreed that where there was doubt, the survey would be deliberately conservative. No attempt was made to assess the profitability of any enterprise or industry.

Field surveys were carried out for flowers, fruit and vegetables on 8 July and 26 August, 1994. A network of local roads was selected which gave a thorough coverage of the agricultural parts of the Shire. Following the survey, observations were totalled and recorded. Field surveys for poultry and agronomy were conducted separately. Other industries were not estimated by field survey. Production values for the horse industry, retail plant nursery, bee pollination, alpacas and goats were unable to be determined.

Table 6.1
Farmland returns - land use summary

	Arcadia	Berribee	Canolands	Dural	Forest Glen	Galston	Glenhaven	Glenorie	Maroota	Middle Dural	Wisemans Ferry	Total
No. of returns	99	1	15	74	4	93	3	72	16	16	6	399
LAND USES												
Stonefruit	32	1	11	12	4	25	0	20	8	4	0	117
Citrus	8	1	2	8	0	15	0	6	3	0	3	46
Apples	3	0	0	0	0	0	0	0	0	0	0	3
Other fruit	4	1	1	0	0	11	0	5	0	1	1	24
Nursery	10	0	0	9	0	9	0	7	0	2	0	37
Flowers	18	0	1	22	0	22	1	10	0	3	0	77
Roses	3	0	0	3	0	3	0	2	1	0	0	12
Trees	4	0	0	4	0	3	0	3	0	0	0	14
Vegetables	21	0	0	23	0	18	0	22	8	8	0	100
Horses	15	0	0	2	0	5	1	4	0	1	0	28
Cattle	11	0	3	10	0	6	1	1	1	2	4	39
Goats	2	0	0	1	0	0	0	1	0	0	0	4
Deer	1	0	0	0	0	0	0	0	0	0	0	1
Sheep	0	0	0	0	0	0	0	1	1	0	0	2
Poultry	9	0	0	0	0	2	1	0	0	0	0	12
Ducks & geese	0	0	0	0	0	1	0	0	0	0	0	1
Bees	1	0	0	1	0	2	0	0	0	0	0	4

Note: A property may have multiple land uses.

(Source: Hornsby Shire Council)

The production survey varies in its degree of accuracy for various industries. The most accurate are those estimates for vegetables, fruit, flowers and poultry and can replace the ABS data for these activities. The least accurate values are those for the nursery and beef cattle industries. The nursery estimate was made in two ways, firstly, information was drawn from national data based on pot levy returns. With the assistance of the Nursery Industry Association, a series of assumptions were then made on the proportion of the industry in NSW, Sydney and Hornsby, respectively. A second approximation was then attempted based on the total number of registered

nurseries in Hornsby Shire. The outcome of these assessments were then compared and found to be in general agreement.

Beef cattle production is characterised by small herds on small properties and is usually a part-time occupation where the owner has off-farm income. As a result, it is felt that cattle numbers may fluctuate considerably from year to year.

The survey estimated the gross value of agricultural production to be \$98.3 million (table 6.2). The rationale for the estimates is explained in Appendix H.

Table 6.2
Value of agricultural production

Product	Sub - totals (\$ million)	Total (\$ million)
Vegetables	6.702	6.702
Fruit	10.077	10.077
Flowers	24.955	24.955
Nurseries - wholesale	50.0	
- retail	Unknown	
Poultry	1.88	
- quail	3.63	
- meat chickens	0.6	
- duck meat	0.143	
- eggs	0.0085	6.26
- pullets		
Pigs	0	0.00
Cattle	0	
- dairy	0.30	0.30
- beef		
Bees	0.0355	
- honey		
- pollination	Unknown	0.0355
Horses	Unknown	
Alpacas/lamas	Unknown	
Total:		\$98.331 million

(Source: NSW Agriculture)

The total value of estimated production of \$98.3 million derived from the Agricultural Production Survey is significantly higher than the 1991-92 ABS value for Hornsby Shire of \$22 million (Wollondilly Shire Council, 1993). As noted, the ABS statistics are based on completed survey returns and include properties with a farm gate value of more than \$22,800. By comparison, the NSW Agriculture survey is based largely on inspection by field officers and their estimates of crop area and production value.

Agricultural activities also have a considerable capital investment associated with them. This includes buildings and structures such as poultry sheds, packing sheds, machinery sheds, hot houses ("Igloos") and hail and bird netting. Plant and machinery used on the properties is also part of the capital investment.

Agricultural activity within the Shire generates substantial economic linkages, or multiplier effects, to other industries such as retailing and other commercial uses (banking, solicitors, accountants etc). The multiplier effect for agriculture can vary although is generally

recognised to be in the order of two to three (Young, 1993). That is every dollar of agricultural output is worth \$2 or \$3 to the economy in total as a result of flow on affects. However, this multiplier ignores the subsequent processing of agricultural products. When such value added processes are included, the total value can be two to three times the initial multiplier (Young, 1993). For example, in the case of the poultry industry the economic multiplier effects have been identified as being 6.77 for employment, 3.25 for output and 0.58 for household income (Larkin 1991).

Agricultural production is a valuable land use activity within Hornsby Shire. The contribution to the economy, when flow-on effects such as secondary processing and employment are considered, may be \$200-300 million dollars. A decision needs to be made as to whether agricultural production should be retained and encouraged within the Shire.

6.3 Aquaculture

The aquacultural activities of oyster farming and commercial fishing within Berowra Creek and the lower Hawkesbury River also contribute to the economy of the area.

Oyster farming is undertaken in the shallow bays of Berowra Creek and its tributaries. Oysters grown in the area are harvested and transported to Brooklyn where they are sorted and purified. Information from NSW Fisheries indicates that in 1993-94, the oyster leases of the Hawkesbury River produced some 7,577 bags or 23,893 dozen Sydney Rock Oysters, representing 9% of the Sydney Region oyster production. The oysters production included 5,973 bags of plate (large shell) oysters, 1,423 bags of bistro (small shell) oysters and 181 bags of processed (bottled) oysters. Young oysters from this area are also transported to other oyster grounds, such as Port Stephens and Forster where they are fattened and produce in excess of 15,000 bags of oysters.

The Hawkesbury River oyster industry employs over 100 persons and is valued in excess of \$6 million, representing 8.5% of the value of the NSW Oyster Industry.

Since oysters were first cultivated in NSW, the annual production steadily increased until it plateaued in recent years. The demand for oysters remains high and is expected to rise, requiring increased production. However, the granting of additional leases is limited by other pressures on the waterway such as boating, fishing and foreshore development. Moreover, many areas that do not experience such pressures are often

not suitable for oyster cultivation because of excessive wave action, flooding or poor oyster growth.

Oyster production requires good water quality and protection from potential hazards such as pollution, siltation and wash from large boats. There is likely to be increasing competition and possible impacts on the oyster industry from development such as boat mooring/berthing, commercial tourist boats, high speed recreational boating, commercial fishing and riverfront residential developments. The continued operation of the oyster industry and its contribution to the river economy should be viewed as an asset both to the local community and broadly to NSW. Accordingly, a planning strategy for the area should encompass provisions which provide protection for the oyster growing environment. Equal consideration should be given to the impacts of oyster growing activities on the estuaries, including alienation of the waterways and the appearance of oyster farming operations.

Commercial fishing is also an important element in the river economy. Information from the NSW Fisheries indicates that up to 80 licensed anglers operate within the Hawkesbury River. The anglers net fish and crustaceans and trawl for prawns along the Hawkesbury River and its tributaries. Commercial fishing within the Hawkesbury River produces some 410,000 kilograms of fish, molluscs and crustaceans per annum with a monetary value of approximately \$1.6 million. Table 6.3 provides a summary of the fish catch for the Hawkesbury River and the estimates for Berowra Creek.

Table 6.3
Fish catch

	Hawkesbury River Kg	\$	Berowra Creek Kg	\$
Fish				
Bream	24,730	\$164,964	3,710	\$24,745
Mullet	108,179	\$121,317	54,090	\$60,659
Mulloway	21,784	\$143,465	2,178	\$14,347
Other	106,396	\$237,175	10,640	\$23,718
Sub-total	261,089	\$666,921	70,618	\$123,469
Molluscs	17,568	\$35,978	1,757	\$3,598
Crustaceans	133,224	\$881,495	13,322	\$88,150
Total	411,881	\$1,584,394	85,697	\$215,217

(Source: NSW Fisheries)

Fishing exploits a biological resource, which is renewable if properly managed. The industry is managed by the NSW Fisheries who issue licences for commercial fishing. It is important that breeding areas, food resources and good water quality conditions remain in the river system to maintain the fish population and the valuable input of the fishing industry to the river economy.

6.4 Business Centres

The economic environment within the study area is influenced by the business activities and planning provisions which regulate business centres. The economic environment within business centres comprises retail facilities supplemented by service facilities, such as banks, offices, video hire outlets and the like. The vitality of the business centres plays an important role in the ability to attract clientele and maintain viable business precincts. The vitality of each business precinct is primarily a function of the business profile and the convenience and attractiveness of the precinct as a place to shop and recreate.

The following discussion examines the role and functions of the business centres within the Study Area, the future demand for retail and commercial activities within the Study Area, and the future role and functions of these centres.

The Study Area comprises three areas zoned for commercial purposes located at Wisemans Ferry, Galston and Dural Service Centre (figure 6.4). Only two of these areas support typical commercial centres comprising predominantly retail uses, namely Galston and Wisemans Ferry. The Dural Service Centre does not comprise a typical commercial centre as it prohibits the development of typical retail uses. This centre acts as a service centre providing a range of business and industrial services to the wider community. The Study Area also includes a general store at Arcadia which does not occupy a commercial zoning, as well as a marina at Berowra Waters which comprises a restaurant, take-away food outlet and commercial facilities associated with the operation of the marina. These areas are not included in the overview of business centres, although contribute to the economic environment within the study area.

6.4.1 Existing Commercial Centre Characteristics

As indicated in chapter two, the commercial centres at Wisemans Ferry and Galston are zoned Business C (Neighbourhood) which permits development that accommodates the retail, service and social needs of the neighbouring community. The Dural Service Centre is zoned Business E (Service Centre) and functions as a service centre rather than a retail centre. Retail establishments which serve the daily needs of the workforce within the zone are permitted, as well as bulky goods retailing establishments.

The Rural Lands areas of Baulkham Hills and Hornsby Councils are divided by Old Northern Road. A variety of retail and commercial uses exist on both sides of this road and commercial facilities within the Study Area cannot be considered in isolation to those existing on the Baulkham Hills side of Old Northern Road. The major commercial centres operating within Baulkham Hills Shire which service the needs of residents living in the Study Area include shops at Round Corner Dural, Middle Dural and Glenorie. A brief description of each centre and their influences are provided as follows.

Galston

The Galston Commercial Centre is located along Galston Road, stretching westwards from Arcadia Road. A total of seven lots comprise the commercial zoned land within the Galston area. A number of individual centres currently make up the Galston commercial centre which all have their own parking areas.

The shopping centre functions as a series of separate establishments rather than an integrated centre, due primarily to its irregular layout and the lack of connection between car parking areas for each establishment. The commercial centre provides a large variety of commercial establishments including a petrol station, supermarket, police station, dental surgery, chemists, hardware store and butchers. A take-away food store is located near the corner of Galston Road and Arcadia Road and a retail plant nursery and cafe is situated on the corner of Galston Road and Bellbowrie Close.

Wisemans Ferry

Wisemans Ferry commercial centre is located at the entrance to the township of Wisemans Ferry along River Road. Commercial activities within

the township are situated on both sides of the main road, which fall within the boundaries of both Hornsby and Baulkham Hills Shire. The commercial centre on the Hornsby side consists of a video shop, a hotel/motel, and a village shopping centre. The commercial centre services the needs of the local community as well as supporting a tourist population. Wisemans Ferry is a popular tourist location within the Sydney Region and provides a scenic picnic park on the Baulkham Hills side of the township. The commercial activities which exist on the Baulkham Hills side of River Road include a petrol station and convenience store, a new motel complex which features a restaurant, a post office, and a community health care and resource centre.

Dural Service Centre

The Dural Service Centre is located along the eastern side of New Line Road between Quarry Road and Sebastian Drive. The Dural Service Centre is not typical of a commercial centre as it does not contain retail premises. The Centre is characterised by a mix of light industries, bulky goods retailing establishments, fast foods outlets and residential uses.

Round Corner Dural

Round Corner commercial centre is located at the junction of Old Northern Road and Kenthurst Road. This centre functions as a large local centre and comprises a variety of shops, offices, restaurants and automotive industries. The centre offers a range of banking facilities, real estate services, restaurants and cafes, homeware shops and specialist clothing shops, but does not include a large supermarket or discount variety store. This centre is larger than Galston Commercial Centre and, as a result, is likely to service a number of Galston residents through its greater range of products and the additional services it provides. This centre also services the residential population of Dural on the Hornsby side of Old Northern Road.

Dural Village

Dural Village Centre is located on Old Northern Road near the Galston Road intersection. This centre functions as a small local centre comprising a total of 10 establishments. These include a supermarket, newsagency, chemist, butcher, take-away shop, dentist, hairdressers and a restaurant. This centre services the daily needs of local residents in both Baulkham Hills and Hornsby Shires, as well as passing traffic due to

its location on the main road. Unlike the shops at Round Corner, this centre does not influence the shopping patterns of residents within the Study Area to a large extent. This is due primarily to its close proximity to the larger Galston Commercial Centre and to the constraints from traffic and access to and from the site.

Glenorie

Glenorie Commercial Centre is located at the junction of Old Northern Road and Post Office Road. This centre functions as a local centre which services the needs of local residents from Glenorie, Galston, Arcadia and Berribee. The centre comprises a total of 23 establishments and is supplemented by Glenorie R.S.L. The centre functions principally as a retail centre with only three non-retail establishments. The retailing function and the centre's location along Old Northern Road also attracts residents from Maroota and Wisemans Ferry.

In summary, the existence of these centres within Baulkham Hills Rural Lands Area generates cross over trade with residents of the Study Area. Similarly, the commercial centres existing within the Study Area service the needs of people residing within Baulkham Hills Shire. This cross over trade partly explains why the provision of commercial centres within the Study Area is somewhat limited.

Furthermore, the shopping centres of Castle Hill and Cherrybrook also serve the needs of residents of the Study area by providing higher order goods and services at the level of a sub-regional centre (Castle Hill) and a district centre (Cherrybrook).

6.4.2 Role and functions of the Commercial Centres

The role and functions of a commercial centre are defined by its place in the extended network of centres serving local, district, sub-regional and regional needs. The role and functions of each commercial centre within the Study Area are discussed as follows.

Wisemans Ferry

Wisemans Ferry is representative of a local centre, servicing the needs of neighbouring residents and tourists. The land use map (Figure 6.5) is illustrative of the functions of this centre. The principle functions of the centre are:

- (i) Retailing, supporting the daily needs of the local community and tourist visitors;

- (ii) Restaurants and the hotel fulfil local and tourist needs for food and entertainment.

Galston

Galston commercial centre is representative of a local centre, servicing the needs of local residents and surrounding rural communities. The land use map (Figure 6.5) is illustrative of the functions of this centre. The principle functions of the centre are:

- (i) Retailing is the predominant land use within the centre, providing a large selection of retail establishments to serve the local community.
- (ii) Small businesses including a dentist, conveyancing service, financial planning and a community policing centre, fulfil a number of local needs.
- (iii) A selection of restaurants and take-away food outlets service the local population, providing a source of entertainment at night.
- (iv) One bank and one real estate agency service provide local services.
- (v) A retail plant nursery and cafe located opposite the main commercial centre support a growing tourist population attracted to the Galston area as well as servicing the local community.

Dural Service Centre

Dural Service Centre is representative of a district centre, servicing the needs of the wider metropolitan community. The land use map (Figure 6.5) is illustrative of the functions of this centre. The principle functions of the centre are:

- (i) Retailing is restricted only to shops ancillary to development permissible in the area or which service the daily needs of the local workforce. There are

currently no retail establishments operating in the centre under these provisions, with the exception of bulky goods retailing establishments which are permitted under the zoning.

- (ii) Bulky Goods Retailing Establishments are located in the relatively new complex along New Line Road at the intersection of Old Northern Road, and along the eastern side of New Line Road.
- (iii) A number of restaurants, coffee shops and fast food establishments are located within the northern section of the commercial centre and serve the needs of local residents and the local workforce.
- (iv) A medical centre provides health services to the local community.
- (v) A number of auto-related industries provide services to the wider community.
- (vi) Rural supplies including horse equipment, irrigation equipment, fencing, farm machinery, and stockfeed are provided from a variety of establishments within the centre.

6.4.3 Floorspace

Information on the floorspace of each centre has been collected by field inspection with reference to Council development consent records and the records of the managing agents of some centres. Detailed floorspace provisions are shown in Appendix I. Table 6.4 provides a summary of floor space provisions. Relevant features are:

- (i) a strong concentration of retail floor space in Galston and Wisemans Ferry;
- (ii) little office floor space in the commercial centres;
- (iii) a proliferation of light industrial uses in the Dural Service Centre zone;
- (iv) retail activities are designed to service local needs and tourism.

Table 6.4
Retail and Commercial Floor Space

Centre	Leasable Floor Area (m ²)			Total
	Retail	Commercial/ Office	Other	
Wisemans Ferry	702	24	651	1377
Galston	2279	361	400	3040
Dural (Block 1)	2404	444	3254	6102
Total	5385	829	4305	10519

(Source: Hirst, 1995)

Table 6.5 shows a summary of vacant floorspace in Wisemans Ferry, Dural Service Centre (Block 1) and Galston. Wisemans Ferry and Galston Commercial Centres currently have a vacancy rate equal to 4% and 5% of their total leasable floor areas. Dural Service Centre (Block 1) differs greatly from the low vacancy rate displayed in Wisemans Ferry and Galston, as it has a vacancy rate equal to 44% of its total leasable floor area. This higher figure is understandable given the recent completion of the development in this part of the Centre.

6.4.4 Estimate of Retail Expenditure and Future Demand

The retail expenditure for the study area can be estimated by considering the 1991 Census data (chapter ten) and the Household Expenditure Survey results published by the Australian Bureau of Statistics (ABS) in 1988/89, updated by reference to the Consumer Price Index (CPI). This procedure allows an estimate to be made of the total spending on retail goods by each household in the Study Area. This spending can be compared with the Sydney average. The results are set out in Table 6.6 which shows the following:

- * Expenditure per household is estimated at \$20,995 which is higher than the Sydney average;
- * Food expenditure (which accounts for a high proportion of local spending) totals \$6,301 per household;
- * In total, households in the Study Area will spend approximately 60.3 million dollars per year on all shopping trips.

The high expenditure levels reflect the above average incomes in the Study Area which have been observed previously.

6.4.5 Proportion of spending captured in the study area

The share of resident expenditure which is captured by shopping centres depends upon their location and the range and quality of their services. In this regard it is useful to distinguish various types of centres, as follows:

- (i) Sub-regional centres (e.g. Castle Hill)
- (ii) District centres (e.g. Cherrybrook)
- (iii) Large local centres (e.g. Round Corner)
- (iv) Local centres (e.g. Galston)

**Table 6.5
Vacant Retail and Commercial Floor Space by Commercial Centre**

Centre	Retail	Leasable Floor Area (m ²) Commercial/ Office	Other	Total
Wisemans Ferry	58	N/A	N/A	58
Galston	100	56	N/A	156
Dural (Block 1)	N/A	N/A	2665	2665
Total	158	56	2665	2879

(Source: Hirst, 1995)

**Table 6.6
Retail expenditure summary per household**

Retail commodity groups	\$ per household	Total (\$million)	Sydney \$/Household
Food for Home	6301	18.1	5807
Clothing	2338	6.7	2009
Small Household Goods	3148	9.0	2801
Large Household Goods	5750	16.5	4855
Personal Services	974	2.8	841
Food Restaurants/Takeaway	2483	7.1	2110
Total	20994	60.2	18423

Note: Money Values at December 1994, CPI at 112.8.

(Source: Hirst Consulting Services Pty Limited 1993)

Table 6.7
Proportion of household shopping expenditure undertaken in local shopping centres

% of Household Shopping Expenditure undertaken in Local Shopping Centres	% of Respondents
10%	30%
20%	16%
30%	10%
40%	6%
50%	10%
60%	5%
70%	6%
80%	7%
90%	10%

(Source: Hornsby Shire Council)

To this list must be added various other retail outlets including markets, bulky goods retail outlets, and convenience stores.

Total retail expenditure is shared between these various centres and outlets. As a general rule, the share captured by local centres (including large local centres) is between 25-30% of total expenditure. Planning studies for retail centres consistently show results in this range.

The household surveys also give some indication of the proportion of spending captured in the Study Area. A total of 1074 households responded to the survey. The responses to the question of "the percentage of household shopping expenditure undertaken within local shopping centres" (table 6.7).

On average, this would indicate that 35% of household expenditure is captured by the Study Area. This capture rate is unusually high for local centres and is more representative of that generally achieved by district centres. Based on the existing retail provision, observed trading patterns, and studies undertaken in similar areas, it is considered that this capture rate as recorded by the survey is probably overstated and that the actual capture achieved by the local area is in the order of 25%. This results in total current sales to local residents of some \$15 million. To this must be added sales to non-residents, particularly tourists which would comprise about 15% of sales, that is about \$2.25 million. This estimate is based on consideration of the high proportion of sales occurring within the area on weekends. For this reason it is estimated that sales to non-residents are unlikely to exceed 15% of sales, since the level of these sales are not consistent over a seven day period.

Therefore, total retail sales in the Study Area are estimated at \$17.25 million per year. This sales estimate can be considered with reference to retail floorspace provision. In total, the Study Area comprises 5,227 square metres of occupied retail space. Based on estimated sales of \$17.25 million the average sales per square metre of retail space in the study area, per year in the study area, are currently around \$3,300. This compares closely to the Sydney average of \$3,360 per square metre, per year, as recorded by the retail census published by ABS.

The type and quality of retail facilities varies widely across the Study Area and performance levels will vary widely from the average which is set out above. However, the share of retail expenditure captured by the existing shops is reasonably in line with the Sydney average and is neither in gross undersupply or oversupply. Therefore it is likely that current pressure for change will be due to one of two factors, namely:

- (i) replacement of obsolescent space with new premises, or
- (ii) improved and enlarged facilities aimed at increasing the capture rate of expenditure from local residents.

Having regard to the particular circumstances of each case, proposals regarding either or both of the above mentioned factors could be justifiable. If proposals seek to increase the capture of available expenditure they will benefit by any broadening of the available range of goods and services (in addition to those existing) which they might achieve.

6.4.6 Results of Resident Survey

A resident survey of the Rural Lands Area was carried out as part of its Rural Lands Study. The part of the survey relating to shopping has been used in this Study to determine shopper patterns in the Study Area. A summary of the results of the survey is provided as follows:

- * Only 35% of respondents do more than 50% of their grocery shopping at their local centre. Almost a third of respondents undertake 10% of their shopping in their local centre, followed by a further 17% who undertake 20% of their grocery shopping in their local centre.
- * 64% of respondents felt that their local centre was adequate in terms of the services it provided, 24% felt it was inadequate and 12% felt that it was more than adequate.
- * A high proportion of respondents would like to see the range of products and price of products improved in their local centre. Improvements to parking facilities and the look of the centre rated moderately among desired improvements.
- * Forty percent of Galston grocery shoppers live in Galston, with a further 25% living in Arcadia, 12% in Middle Dural and 10% in Dural.
- * Thirty four percent of Dural Grocery shoppers live in Dural, with a further 17% in Galston, 14% in Middle Dural and 12% in Arcadia.

It should be noted that these results do not reflect shopper patterns of residents in Baulkham Hills Shire, who also use retail and commercial facilities within the Hornsby Council Area.

6.4.7 Future Population Growth

There presently exists very little potential for population growth in existing zones. However, it is noted that there are extensive Crown Land areas in the northern part of the Study Area which provide some potential for future rural subdivision. It is envisaged that any possible growth in these areas would be long-term involving a planning horizon of 15-20 years.

It is concluded that the previously observed population growth rates (23% between 1981-1991) will not continue in the future, unless Crown Land is developed, and that the population has essentially stabilised. The rapid growth rate between 1981 and 1991 was mainly due to the development of the lands in South Dural which are now almost fully developed.

Even if some minor growth is accommodated through intensification of development or small rezonings, the scale of growth will not be sufficient to have a significant impact on retail and commercial demand. It can be anticipated that demand for housing to suit the needs of aged persons will increase over the medium and long term future. This demand will be generated by the aging of the population already resident in the area. If any major rezonings derive from this Study, it will be necessary to review the retail and commercial demand forecasts set out in the following section.

6.4.8 Future demands for retail and commercial space

Potential Expansion of Centres in Study Area

In considering the potential expansion of commercial centres in the Study Area the following principles can be applied:

- (i) Limited population growth will restrict potential expansion of retail and commercial centres;
- (ii) Some expansion could be accommodated based on an increase in retail expenditure capture rates;
- (iii) Future employment opportunities may also be generated by the increasing trend toward home based employment linked to changes in communication technology;
- (iv) As a general principle, an expansion of up to 25% on existing retail space could occur, that is, approximately 1,500 square metres overall unless particular retail innovations demonstrate otherwise.

The role of each centre is unlikely to change in the future. The proposed expansion of Galston Commercial Centre would increase existing floorspace significantly, however, the constraints posed by location and limited population growth would retain the centre's role as a local one.

In considering any proposed new commercial developments or expansion of existing centres, particular emphasis should be placed on good design and the ability of the proposal to integrate with the existing centre, especially in Galston. One of the major problems of the Galston Centre is that it lacks integration as it is comprised of a number of separate commercial entities each with their own carparking area.

Any expansion of commercial facilities within the Dural Service Centre should enhance the service functions of this centre and discourage the encroachment of typical retail facilities. The type of retail facilities permissible within the Dural Service Centre have been debatable in the past and should be limited to those which principally service the needs of the local workforce.

Potential expansion of linear retail and commercial facilities along Old Northern Road and New Lane Road are constrained by their non-commercial zonings and the limited expansion under existing use rights which are applicable to a number of facilities. These retail and commercial facilities are of particular value in attracting tourists to the area and in maintaining the rural ambience of the area. However, in order to retain the present scale of these uses it is not appropriate that these areas be rezoned to commercial as this could lead to an intensification of retail and commercial uses in this area.

Current retail employment within the study area is estimated at 350 - 400 jobs. It is difficult to predict the result of current and future trends of non retail employment, although an allowance of 25% above present local employment rates is considered appropriate. This provision could result in an increase in local employment of some 100 jobs. In line with current retail employment trends, many of these would probably be part-time or casual jobs.

Future Role of Existing Centres

Limited changes in population growth within the Study Area indicates that the role of the commercial centres are unlikely to change in the future. Expansion and intensification of the centres may occur, but this will not alter the status of the centres as local centres. Having regard to the existing centres at Baulkham Hills and Cherrybrook, a district centre could generally not be sustained by the current population surrounding the commercial centres within the Rural Lands Area. Potential changes which may occur in each centre are discussed as follows.

Galston: It is envisaged that Galston will remain a local centre, as major growth is not possible due to limited population growth. It is however, possible that expansion of existing retail and commercial facilities will occur in Galston, as a block of presently undeveloped commercial land is located next to the existing commercial centre. It is possible that an increase in the capture rate of potential expenditure may occur with an expansion of existing facilities, thereby increasing retail sales within the centre. In order for this to occur, any new commercial development will need to improve Galston's present problems associated with the lack of integration of shops and parking. The success of any new development within Galston will depend on its design and its ability to integrate and thereby improve the existing centre.

The potential also exists for an expansion of office services within the centre, providing convenient access to these services for the local population. Improvements in technology and communications have seen the decentralisation of small businesses to areas outside CBD locations. The potential development of new office space at Galston may attract some local people who currently operate a home business in the area. The trend for small businesses to establish in suburban and rural areas is illustrated with reference to Dural.

Wisemans Ferry: No expansion of retail or commercial facilities are forecast for Wisemans Ferry due to its isolated location and limited potential for future residential development. The centre will continue to provide convenience goods to the local community as well as servicing the needs of tourists. The centre currently allows for the establishment of further retail facilities in its two vacant shops.

Dural Service Centre: It is envisaged that the Dural Service Centre will continue its main role of providing a range of service and industrial activities for the wider Sydney community, without the introduction of typical retail establishments that serve the local population. The shops at Round Corner and Dural Village, which are located within Baulkham Hills Council Area, provide a sufficient amount of retail and commercial establishments for the local population without the need for expansion of these facilities into the Dural Service Centre. As previously mentioned, a considerable proportion of the Dural Service Centre which has already been developed is vacant and further expansion of

the centre is possible. Given the high vacancy rate within the centre at present, it is envisaged that the further development of land within this zone will not occur for a number of years.

6.5 Rural Industries and Home Offices

Other sources of employment in the rural areas include rural industries and home offices. Phone book searches have revealed the occurrence of some 110 industrial activities, 174 office based activities, 19 beauty, health and medical businesses, 53 retail and 26 animal boarding, veterinary and breeding establishments. The distribution of these businesses is summarised in Table 6.8.

The size of rural properties can allow small businesses, including manufacturing activities, to be concealed from adjoining neighbours' view and not affect the amenity of the area. However, many of the businesses which initially commenced as hobbies or small operations have grown to the extent that they have potential to affect the amenity of the area. Complaints received by Hornsby Council relating to business in the rural areas include noise pollution, hours of operation, visual pollution, traffic and the use of non-resident employees.

The economic value of these activities cannot be easily determined. Nevertheless, it is acknowledged in the survey returns indicating 7%

of persons deriving an income on the property are understandably manufacturing light industrial activities and that these activities provide employment and economic benefit to the area. Such benefit should be balanced against potential amenity and environmental impacts and the implications of the vitality of business service centres in the area.

6.6 Tourism

Tourism is one of Australia's fastest growing and economically important industries (Commonwealth Department of Tourism, 1993) Similarly, tourism within Hornsby Shire is an important industry in the Shire of Hornsby with a strong growth potential. Although there are no figures relating to the study area specifically, and there are differences in the estimates for Hornsby Shire. The Hornsby Shire Local Tourism Plan estimated that the Shire receives over one million visitors per year, generates \$29 million in visitor expenditure and employs over 1,000 people (Price Waterhouse Urwick, 1993). However, data from NSW Tourism estimates that the Shire received 277,000 visitors in 1993/94 and generated \$85 million in visitor expenditure (NSW Tourism, 1995). For the purposes of the study, the figures from the Local Tourism Plan are considered to be relevant, as the study made a detailed examination of tourism within the Shire.

Table 6.8
Summary of business activities

	Industrial	Offices	Beauty & Health	Commercial	Animals	Total
Glenhaven	3	2	-	-	-	5
Dural	38	67	4	27	8	144
Galston	26	47	10	14	8	105
Arcadia	23	39	2	11	3	78
Berrilee	5	1	1	1	2	10
Fiddletown	-	5	-	-	-	5
Glenorie	15	13	2	2	5	37
Total	110	174	19	55	26	384

(Source: Hornsby Shire Council)

The most obvious benefit of tourism is the affect upon the local economy. However, there are many other positive impacts. Tourism increases the range of goods and services provided in the area through increased demand and enables the local area to be exposed to a broader range of people and cultures. In addition, tourism contributes to enhanced community pride, as a result of the recognition and promotion of features which are unique or admired by people outside the area.

Tourism will become increasingly important in the Sydney Region over the next 5 to 10 years as a result of the 2000 Olympics being held in Sydney. Hornsby has the opportunity to benefit from the expected surge in tourism and needs adequate tourism infrastructure in place to cater for the tourists needs in both the short and long term.

Tourism needs to be addressed at both the macro and micro level, in terms of its publicity and promotion. At the macro level, the study area falls within the Hawkesbury River Region which encompasses the local government areas of Hornsby, Echam Hills and Hawkesbury. Visitors to the region will often pass in and out of the different Council areas, completely unaware of the local government boundaries. The natural features and attractions of the region often straddle and overlap the three Council areas, creating a distinct and cohesive rural character.

From a local perspective, the study area is unique within the Region and therefore plays an integral role in its overall success. Specific attractions in the area such as individual nurseries, farms, parks, accommodation etc, need to be promoted in their own right, so they continue to contribute to the Region as a whole.

6.6.1 Attractions

The Hornsby Shire Local Tourism Plan (Price Waterhouse Urwick, 1993) identifies the tourist activity to be concentrated in six main areas, namely Brooklyn, Berowra Waters, Wiseman's Ferry, Bobbin Head, Galston and Dural, and Pennant Hills. The key attractions in the Shire however, have been identified as being Brooklyn, Berowra Waters, Wisemans Ferry and the rural area. The Tourism Plan identifies the Shire as having a strong day tripper market and indicates that picnicking and barbecuing, followed by bushwalking are the principal activities of visitors to the Shire. The attractions of the study area can be divided into two categories, namely natural and man-made.

Natural attractions

The visual quality of the natural environment contributes greatly to the amenity and character of the area and provides a scenic backdrop to many parts of the study area. The proximity of the study area to the National Parks, bushland reserves, and waterways also provides a pivotal role for the study area in the tourism network.

The main natural attractions in the region are Marramarra National Park, Berowra Valley Bushland Park and the Hawkesbury River. Visitors either pass through the study area to reach these attractions or view the attractions from the study area and contribute to the visual quality of the environment.

Marramarra National Park is located in the northern part of the study area, and covers approximately 132km². The park offers the basic visitor facilities such as walking trails, picnic facilities, lookouts and camping grounds. Aboriginal sites are also contained within the Park, however they are not widely publicised to ensure their protection. The Marramarra National Park is currently the responsibility of the NSW National Parks and Wildlife Service.

The Berowra Valley Bushland Park forms the south eastern boundary of the study area and incorporates much of the upper catchment area of Berowra Creek, including Galston Gorge. One of the main attractions of the park is the Benowie Walking Track, which forms part of the Great North walk, and extends from Cherrybrook in the south of the Shire to Berowra Waters. Other attractions of the park include camp-sites, picnic areas and historic sites. The park is open to the public at all times and is accessible from many parts of the study area.

The Hawkesbury River is a significant natural feature for visitors and forms the north eastern boundary of the study area. The Hawkesbury and its tributaries provide both scenic and recreational value to the study area and have attracted visitors since the settlement of the colony. House boats and river cruises are popular, and at Wiseman's Ferry, water skiing is also extremely popular.

Man made attractions

Man made attractions are generally considered to be secondary tourist resources, serving as a by-product of the natural resources. The primary man made attractions in the study area include;

- * Rural scenery and atmosphere, including agricultural industry and road side stalls;
- * The villages of Dural, and Wisemans Ferry;
- * Fagan Park;
- * Plant nurseries, particularly Swanes;
- * Galston Valley Miniature Railway;
- * Golden Ridge Animal Farm.

In addition to the abovementioned attractions in the adjacent Tobruk Sheep Station at Maroota has been identified as a major attraction in the Baulkham Hills Shire.

The majority of the visitors in the study area are visiting nurseries and/or sightseeing and Wiseman's Ferry is often an ultimate destination point for many day trippers. Coach trips are popular for groups visiting Fagan Park and Swanes Nursery and refreshment stops are also popular at both Galston and Dural.

It has been estimated that Fagan Park, Swanes Nursery and the Galston Valley Railway attract over 60,000 visitors per annum, thus contributing substantially to the local economy of the study area.

Rural scenery and atmosphere

The agricultural activity throughout the area has created a distinct rural character and atmosphere. The elements which combine to create this atmosphere include; grazing lands and animals, flower farms, orchards, timber cottages, unsealed roads, trees and views to bushland.

In addition, the area is sparsely settled and has a distinct open feeling in many parts. The views of the Blue Mountains and National Parks contribute to this sense of openness. Visitors are also attracted to the opportunity of purchasing produce at the point of production via roadside stalls and nurseries.

The area offers a vastly different lifestyle and atmosphere to the urban areas of the Shire, yet is within an hours drive from the city. In this regard, the area is strategically located for the short breaks and overnight tourist market.

The atmosphere and character of the area has been under pressure in the recent past as a result of the increase in rural-residential development, displacing the traditional agricultural uses of the land. The encroachment of urban development in the southern sections of the area and the

introduction of non-rural based land uses in some parts has also placed pressure on the character of the area. These issues should be addressed through planning controls if the rural character of the area is to be maintained.

The villages of Dural and Galston

The villages of Dural and Galston are strip shopping centres which have developed over the years in an ad hoc manner. Although they have little architectural or design merit, they have a distinct "country feel". This is possibly attributed to the lack of coordinated planning and design and the continued use of small individual shops as opposed to large shopping complexes, common in urban areas.

Although there is the scope to improve the villages visually, it is important to maintain the small scale, country charm of the villages and not "urbanise" them by applying a standardised formula. It is also important for the shop owners to be aware of the increasing tourist market, and catering for their needs in addition to the local residents, without promoting a bias toward tourist retailing.

Fagan Park

Fagan Park occupies an area of 55 hectares in Galston and originally formed part of the property of the Fagan family who were well known in the area for agricultural production. The property was donated to the community in 1979 by Mr Bruce Fagan and was transformed into a regional recreation facility. The park is now managed by Hornsby Council.

The Park accommodates the original Fagan home; Netherby Cottage and associated rural outbuildings, the Gardens of Many Nations, BBQ facilities, children's playground, bushwalking trails and passive recreation areas. In 1991 and 1994, the park attracted 38,000 and 65,000 visitors respectively, and in 1994 generated income in the vicinity of \$50,000.

The Park is used annually for the Galston Rotary Club Spring Fair, and on a regular basis by the Hornsby District Model Engineers and by local schools for cross country athletics. Recently, Council held a Heritage Day at Fagan Park which promoted its heritage significance and included other attractions such as the horse and buggy, model boats, a blacksmith, morning and afternoon teas and a folk band. The event was successful in attracting an estimated 5,000 people

and has the potential to be conducted as an annual event.

Council has developed a number of strategies to increase the patronage of the park, including expanding picnic and BBQ facilities and playgrounds and introducing a farm display area, markets, golf driving range, native animal park, equestrian facilities and orchard displays. Local residents have also suggested the inclusion of a restaurant and/or tea room/kiosk to provide food and beverages in the park.

Nurseries

There are a number of nurseries scattered in close proximity to each other in the study area, mostly around Dural, Arcadia and Galston. Possibly the most popular is Swanes Nursery, located at Dural, occupying a site of 18 hectares. It is famous for its extensive display of roses, being the largest collection in Australia. The Nursery also provides horticultural advice, guided tours and a coffee shop. The nursery attracts coach tours, school groups and garden clubs. It is estimated that some 50,000 people visit Swanes Nursery each year to view the displays.

Galston Valley Miniature Railway

The Miniature Railway is run by the Hornsby and District Model Engineers Society and includes a model system replicating a full size railway, including stations, level crossings, bridges and signal boxes. The trains are fully working models of original steam trains.

The Railway is only open to the public once a month due to the regular maintenance required on the trains and the demands on the members of the society. There is however, the possibility of opening the railway on a second weekend day and therefore attracting increased visitation.

Golden Ridge Animal Farm, Dural

This animal farm is an educational demonstration farm directed to children. The farm has daily demonstrations including milking cows, feeding ducks and geese and handling baby animals and is popular with school groups.

Tobruk Merino Sheep Station

The Tobruk Merino Sheep Station is located on the Old Northern Road at Maroota and is the headquarters for an Australian Grazing Company. The Station is a working sheep property, however

includes tourist attractions such as sheep shearing displays, BBQ, dining room and souvenir woollen clothing store. Although this attraction is located in Baulkham Hills Shire, just outside the study area boundaries, there are benefits to the study area in additional visitation.

6.6.2 Tourism Infrastructure

Tourism infrastructure relates to the resources that service the tourism industry. These include accommodation, conference facilities, signposting/information services and access and transport.

Accommodation

The Local Tourism Plan recognises the diversity of accommodation currently available in the Shire, however notes that the number of rooms/beds are low when compared to the market demand. The main sources of tourist accommodation in the study area are summarised in table 6.9.

Considering the size of the study area, the amount of accommodation available is very low and is largely concentrated on, or near the Hawkesbury River. There is little available in the inland rural area, near the main tourism attractions.

The Local Tourism Plan identified the following accommodation opportunities, particularly for the weekend/short breaks market;

- * self-contained cabin accommodation in Wiseman's Ferry and possibly the rural areas;
- * guest house accommodation in the rural areas;
- * backpackers/hostel accommodation at Wiseman's Ferry; and
- * ecotourism facilities associated with the Hawkesbury River and bushland area.

It is recognised that a certain number of guest houses and bed & breakfasts are currently operating on an informal basis in the rural area, proving a demand for this type of accommodation.

Guest house and bed & breakfast accommodation usually utilise existing buildings and structures and therefore have a minimal physical and visual impact on the environment. For this reason, this type of accommodation is particularly suitable in the study area. In addition, there are a number of dwellings that have been identified as heritage

items in the rural area which could be suitable for this type of accommodation.

**Table 6.9
Tourist Accommodation**

Accommodation Type	Location	No. of facilities
Motel/Hotel	Wisemans Ferry	2
Caravan Parks	Berowra Waters	1
	Dural	1
	Wiseman's Ferry (BH)	6
Camping grounds	Crosslands	1
Group Accommodation	Crosslands	2
	Arcadia	1
Holiday houses/flats	Laughtondale	Unknown
Guesthouses	Rural area	Unknown
Houseboats	Wiseman's Ferry	1

(Source: Hornsby Shire Council)

Backpackers accommodation is different in nature as it usually involves large structures providing a large number of rooms. Careful consideration would need to be given to the impacts of this type of development on the local area. In addition, the accessibility of this type of accommodation for backpackers would also require due consideration.

Ecotourism accommodation is nature based tourism activities and facilities. The extensive bushland and waterway resources of the study area provide an ideal setting for this type of activity. Proposals should involve education and interpretation of the natural environment and be managed to ensure ecological sustainability.

As a consequence of the exhibition of the River Settlements Study (HSC, 1993b), Hornsby Council received a submission proposing a rezoning to permit the establishment of an ecotourism facility at Melvys Wharf, Fishermans Point on the Hawkesbury River. The proposal has merit and it should be exhibited as part of a future plan to address tourism throughout the Shire.

An additional type of accommodation that would also be appropriate in the rural areas is farmstay accommodation. Farmstay accommodation allows travellers to stay on properties involved

with agriculture, aquaculture or on animal establishments and participate in farm related activities.

Conference Facilities

The provision of conference facilities in the study area is extremely limited. The main facilities include the Crosslands Conference Centre and Vision Valley Church Camp. These generally attract school groups, Church organisations and special interest groups. They do not tend to attract corporate trade, however there this potential exists.

Signposting and Information Services

Signposting and information services are a critical component of tourism infrastructure and are relied on heavily by visitors to the area to find their way around. At present, signposting of tourist facilities and visitor information services are poorly developed. However, information within the Shire for local residents is good and there is generally a high level of awareness of the facilities available. As mentioned previously, there are also benefits to be gained from marketing the area from the regional perspective, as part of the Hawkesbury Region.

The most cost effective way to provide information on the study area is to establish information centres at key locations. These information centres involve local businesses providing tourist information on behalf of Council. There is currently one located on Mid Dural Road, Galston, and one will soon be operating in Wiseman's Ferry. There is also the opportunity to lease space in the Baulkham Hills Tourist Information Centre on Old Northern Road, Dural in the future.

Access and Transport

Adequate access to the study area is critical in establishing a sound tourism base. Transport infrastructure in the study area can be divided into the major categories of roads and coach services.

Roads

In the study area, the main through roads are Old Northern Road, Galston Road, Wiseman's Ferry Road and Bay Road. Feeder roads include Laughtondale Road, Mid Dural Road, New Line Road and Arcadia Road. Road access and networking is generally good in the area providing north-south, east-west and circular access.

Roads are important in terms of access, capacity, presentation of the visual catchment area and signposting. If tourism in the area is significantly increased, the ability of the existing roads to cater for the increased use, will be critical.

Scenic trails and coach tours in the area should utilise the existing main and feeder roads which can accommodate increased traffic. Existing unsealed roads should not be sealed for the purpose of providing for tourism. Elements such as this contribute to the rural character of the area and should be retained.

Coach services

The Charter Coach market is already well established in the study area and has the potential for significant growth in the future. The provision for coach parking will need to be incorporated into the future planning and development of the area, particularly at the main tourist destinations and service centres. As mentioned above, the routes for coaches should utilise roads which have existing capacity. Galston and Berowra Waters

Roads are less suitable for tourist coaches as a result of their narrow width and hair pin bends.

6.6.3 Economic Impact

Tourism contributes to the local economy. Although it is difficult to assess the exact expenditure of visitors in an area, it is recognised that expenditure by visitors flows through the economy via the multiplier effect and ultimately benefits all sectors of the community.

In the context of tourism, the multiplier effect can be explained in the following way. A tourist dollar comes from outside the host economy and circulates through the local economy through the use of goods and services, visiting attractions, accommodation and the like. Some money leaves the economy through "leakage" but the remainder stays in the host economy where it is then used to purchase other goods and services by the first recipient. A further link in the spending chain occurs when the second recipient spends the dollar within the host economy and so on. These cycles continue creating the multiplier effect (Tonge & Associates, 1982, p20). Most assessments of economic impacts of tourism however, are at a regional level and therefore make it difficult to accurately estimate expenditure at the local level, particularly for areas such as the study area.

The Local Tourism Plan indicated that overnight visitors spend in general an average of \$80 per night during their visit, based on 1993-94 estimates from NSW Tourism. Figures on expenditure of day visitors is harder to determine. A survey of day visitors in the Sydney Metropolitan area, referred to in the Local Tourism Plan found that expenditure per head varied from around \$12 to \$40 per visit.

In general terms, overnight visitors spend over double the amount that day trippers are inclined to spend. This is due to the extended stay, cost of the accommodation and meals and the increased likelihood of visiting additional attractions or retailers. It is therefore economically beneficial to increase the amount of overnight accommodation in the study area.

Table 6.10
Visitors to Hornsby Shire

	1992/93	1993/94
Visits	249,000	277,000
Nights	1,211,000	1,292,000

(Source: NSW Tourism)

Tourism NSW, has recently published the latest estimated figures on visitation and visitor expenditure for all Local Government Areas (LGA). Tourism NSW has developed a new and improved methodology for assessing expenditure, which removes biases inherent in the previous methods and includes, for the first time, international visitors and children under 14 years of age. In this regard, it has been recommended that comparisons not be drawn between previous figures calculated from the different methodologies. Under the new methodology, the estimated total expenditure for overnight visitors only, in Hornsby Council LGA for the 1992/93 and 1993/94 periods was \$78 and \$85 million, respectively. The numbers of both day and overnight visitors are summarised in Table 6.10. The figure for overnight visitors is higher than the day trippers as it includes the number of nights a visitor may stay in the one place.

As these figures relate to the whole of the Shire, it is difficult to accurately calculate the total amount of visitor expenditure within the study area. However, it has been concluded in the Local Tourism Plan that a large proportion of the attractions in the Shire of Hornsby are contained within the study area.

The natural features of the region are non-profit making and therefore do not directly contribute to the economic environment of the study area. However, they do attract visitors to the area who are likely to stop at the local shops for refreshments/petrol etc and therefore indirectly contribute to expenditure.

6.6.4 Environmental Impacts

It is necessary to address the cumulative effects of tourism, especially those on the environment, to understand the true impacts tourism can have on the local area.

Tourism has the ability to attract so much interest and change in an area, that it has the potential of ultimately destroying or eroding the existing attraction base, which founded the tourism industry. New developments created specifically to cater for the tourism market have the potential to create an inappropriate and unauthentic environment in an attempt to "fit in" with the character of the area. In this regard, tourist developments need to be sensitive in design and unobtrusive in location, to minimise the impact on the visual quality of the area.

New tourist developments or activities also create demands on the existing infrastructure and contribute to environmental problems relating to all developments such as erosion, run-off and pollution. This is particularly relevant in the study area as the majority of the area is not seweraged and is contained within the Berowra Creek catchment area. The capacity of tourism in the study area will therefore largely be dictated by these issues.

To provide for growth of the tourism industry in the future, it is essential to retain the natural and rural environments of the study area, conserve the heritage buildings and structures, improve visual presentation and address water quality issues.

The recent trend of eco-tourism addresses these issues as a result of past negative experiences relating to mass tourism. The theme of eco-tourism should be promoted to educate visitors of the impacts that tourism can have on an environment and to encourage respect for the natural systems and local residents of the area, and to discourage inappropriate behaviour.

6.6.5 Social Impacts

The economic and physical impacts of tourism are tangible and can be readily recognised. Social impacts on the local community are less tangible. As mentioned previously, there are many positive social impacts resulting from tourism, including enhanced community pride, diversification of lifestyles and cultures and increased range of goods and services. However, tourism can increase inappropriate social behaviour such as drunkenness, crime, accidents, noise and overcrowding. In addition, there is concern regarding competition between residents and visitors for facilities and resources and the inflation of prices for goods and services (Research Authority, 1983). In this regard, it is necessary to consider these issues when providing tourism infrastructure in a local area, ensuring that any negative social impacts are minimised.

6.6.6 Tourism Management

Hornsby Council plays a large role in the management of tourism in the area, as a provider of services, infrastructure and landscaping, operator of attractions, consent authority, information provider and employer of a Tourism Officer. Strategies for providing for tourism need to be coordinated within the relevant Branches of Council to ensure a unified approach is taken.

Other bodies which play an important part in addressing tourism issues include the Tourism Committee, Hornsby Tourist Association, National Parks and Wildlife Service and Tourism Commission of NSW. The involvement of these bodies in the decision making process is essential to ensure the objectives of the different authorities are recognised and addressed.

6.7 Economic Environment Conclusions

The study area features a diverse economic environment with input from agricultural production, retailing, aquaculture, tourism and rural industries.

There is not a comparable unemployment problem in any age group within the rural areas of the Shire and the higher than average workforce participation rates are reflected in favourable household income levels. The assessment indicates that agricultural activities provide employment and contribute to household income within the study area. The nature and extent of these activities varies throughout the rural areas. It is important that any strategy recognises these components in order to promote employment opportunities.

The imbalance between population growth and employment opportunities has led to a large proportion of persons being employed outside the study area. Employment dispersal in the northern and western areas of Sydney will continue to affect employment opportunities within the study area.

Agriculture is paramount for the day to day needs of the broader community. Hornsby Shire has a rich agricultural heritage and agricultural production contributes an estimated \$98 million to the economy of the study area and contributes to local employment. If agriculture is to remain a valuable land use within the Shire, it needs to be protected from competing land uses and encouraged through planning provisions.

The aquacultural activities of oyster farming and commercial fishing within Berowra Creek and the lower Hawkesbury River also contributes to the economy of the area. It is important that breeding areas, food resources and good water quality conditions remain in the river system to maintain the fish population and the valuable input of the fishing industry to the river economy.

Total retail sales in the study area are estimated at \$17.25 million per year. The type and quality of retail facilities varies widely across the study area and performance levels will vary widely from the average. However, the share of retail expenditure captured by the existing shops is consistent with the Sydney average and is neither in gross undersupply or oversupply. It is likely that current pressure for change will be due to one of two factors, namely:

- (i) replacement of obsolescent space with -new premises, or
- (ii) improved and enlarged facilities aimed at increasing the capture rate of expenditure from local residents.

If proposals seek to increase the capture of available expenditure they will benefit by any broadening of the available range of goods and services (in addition to those existing) which they might achieve.

A high proportion of respondents to the residents survey would like to see the range of products and price of products improved in their local centre. Improvements to parking facilities and the look of the centre rated moderately among desired improvements. Additionally, 64% of respondents

felt that their local centre was adequate in terms of the services it provided.

Limited changes in population growth within the Study Area indicate that the role of the commercial centres is unlikely to change in the future. Expansion and any new commercial development will need to improve Galston's present problems associated with the lack of integration of shops and parking. The success of any new development within Galston will depend on its design and its ability to integrate and thereby improve the existing centre. In considering any proposed new commercial developments or expansion of existing centres, particular emphasis should be placed on good design and the ability of the proposal to integrate with the existing centre.

Any expansion of commercial facilities within the Dural Service Centre should enhance the service functions of this centre and discourage the encroachment of typical retail facilities.

Potential expansion of linear retail and commercial facilities along Old Northern Road and New Line Road are constrained by their non-commercial zonings. In order to retain the present scale of the uses within the Centre it is not appropriate that this area be rezoned commercial, as this could lead to an intensification of retail and commercial uses.

Other sources of employment in the rural areas include rural industries and home offices. It is acknowledged that these activities provide employment and economic benefit to the area although this should be balanced against potential amenity and environmental impacts and the implications of the vitality of business service centres in the area.

Tourism is an important industry in Hornsby Shire and it is estimated that the Shire attracts over a million visitors per year, contributing approximately \$85 million to the local economy and providing employment for over 1,000 people. Tourism already contributes substantially to the local economy and local employment. The attractions which draw tourists to the area are a combination of both natural and man made resources which together create a distinct rural character. This atmosphere extends beyond the limits of the study area as it falls within the broader catchment of the Hawkesbury Region.

The area has the potential to increase tourism and thus expenditure, by strengthening the tourist infrastructure and in particular, accommodation facilities. There is a need for more low scale tourist accommodation and variety of accommodation types within the study area, including bed and breakfast, farmstay and ecotourism accommodation. There is also a need to establish relevant controls for tourism development to ensure that they do not compromise the natural environment and character which are the very attractions for visitors.

CHAPTER SEVEN - INFRASTRUCTURE

In the preparation of a planning strategy for the Rural Lands Study Area, it is necessary to review the extent and adequacy of infrastructure to supply the existing and future needs of the rural and village communities. This section of the Study will review the provision and adequacy of utilities (electricity, communications, and gas services), water supply, waste disposal, wastewater disposal and drainage within the Study Area.

7.1 Electricity Services

The adequacy of electricity services is most appropriately considered in the context of supply, alternative sources, demand and other issues such as health effects and visual appearance.

7.1.1 Electricity Supply

The Study Area is traversed by eight high voltage transmission lines which distribute electricity to the Sydney Region from power stations in the Lake Macquarie Area (Figure 7.1). This regional transmission network is managed by the Electricity Transmission Authority (ETA). Electricity generated at the Lake Munmorah and Vales Point Power Stations in the Lake Macquarie area is carried to the northern region of Sydney via two high voltage transmission lines (330kv) which terminate at the Sydney North Substation, located at Old Northern Road, Galston. ETA has long term plans to upgrade the 330 kv Munmorah - Sydney North line to 500 kv.

The Sydney North Substation is the major electricity bulk supply point for most of the northern suburbs of Sydney. Electricity is directed from the substation via six smaller transmission lines to zone substations in neighbouring suburbs, three of which operate at a voltage of 330 kilovolts (kv) and three lines operate at a voltage of 132 kv lines.

The transmission lines are located within easements, which provide access for the repair and maintenance of lines and separate the transmission lines from activities on adjacent lands. Residential buildings and other obstructions which would hinder access are not permitted within easements, while open space areas are accepted.

The ETA has requested that environmental planning instruments recognise transmission lines

as service corridors, to enable reconstruction of lines and to allow for widening of easements. As such, it may be appropriate that buildings, sheds, playgrounds and swimming pools be precluded from these corridors.

The widths of the easements vary, with the minimum width being determined by the safety clearances required from any structures, obstacles or activities along the transmission line. Normal safety clearances are in the order of 60m for a 330 kv line and 45m for a 132 kv line. The proposed upgrading of the Munmorah-Sydney 300kv line is likely to require the widening of the existing 60m easement to 70m.

The local electricity supply network is controlled by Sydney Electricity and Prospect Electricity. Sydney Electricity is responsible for the distribution and supply of domestic electricity within the Study Area, however, Prospect Electricity supplies electricity to 40% of the study area under a franchise agreement. Both suppliers purchase power from the ETA's Sydney North supply plant at Galston, and then distribute it to substations and on to individual properties.

The majority of properties within the study area are connected to the electricity supply, with a limited number of properties located on the outskirts of Arcadia and Fiddletown not yet reticulated. Figure 7.1 indicates the extent of the area supplied with electricity. To be connected to the supply grid, the property owner is required to pay the cost of extending the service.

7.1.2 Alternative Sources

Owners of properties not serviced by reticulated electricity rely on alternative energy sources such as generators, bottled gas, solar electricity and wind generators. As part of the residents' survey, a question was asked about the use of alternative forms of energy to supplement services. The responses are summarised in Table 7.1, below. The most common alternative sources are bottled gas and solar hot water.

Analysis of the responses based on locality, indicates that the alternative sources are used throughout the study area and are not concentrated in areas of limited supply. Accordingly, it can be concluded that even in areas of reticulated electricity supply, residents supplement their use of electricity with alternative sources.

Table 7.1
Alternative energy sources

Locality	Petrol/ Diesel Generator	Bottled Gas	Solar Electricity	Solar Hot Water	Wind Generator
Arcadia	3	33	4	18	2
Berrilee	2	10	1	11	2
Canoelands	2	11	2	9	1
Dural	2	22	3	14	0
Fiddletown	1	1	0	0	0
Forest Glen	1	0	0	3	0
Galston	1	41	4	28	0
Glenhaven	0	2	1	1	0
Glenorie	0	9	3	10	0
Laughtondale	3	3	2	2	0
Maroota	0	1	2	2	1
Middle Dural	0	19	1	9	0
Wisemans Ferry	3	5	2	1	0
Total	18	157	25	108	6

(Source: Hornsby Shire Council)

7.1.3 Electricity demand

Sydney Electricity has advised that the existing electricity supply network is capable of supplying the present known and forecast power loads for the Study Area over the next 20 years. Any expansion of urban development within the Study Area could be supplied if the expansion occurred adjacent to existing serviced areas. Accordingly, the provision of electricity services is not a constraint for future development. However, any expansion of the area covered by the network would be undertaken only on a user pays basis.

7.1.4 Health effects

In recent years there has been considerable public debate over the possible health implications associated with high voltage transmission lines and the possible carcinogenic effects of electromagnetic fields (EMF's). Literature on whether or not there is a health risk and how serious that risk may be from living in the vicinity of electricity transmission lines is inconclusive. The literature indicates that it is more likely that magnetic fields pose a health risk than electric fields. Specifically, everyday appliances such as electric toasters, blankets and shavers create greater magnetic fields at lesser distances than

500kv transmission lines, though for shorter durations. Further complicating the issue is the fact that it is not known whether high or low strength magnetic fields are more likely to pose a serious health risk.

Though it is yet to be scientifically proven that EMF's have negative health effects, concerns that they may act as a trigger for various cancers has provided the impetus for extensive research around the world. In New South Wales, the Gibb's Report (1991) has been the most comprehensive inquiry into the possible health implications of high voltage electricity transmission lines to date. Drawing from findings around the world, the Gibb's Report concluded that in the absence of conclusive evidence of any negative health effects, but with strong circumstantial evidence, the most appropriate course was a policy of "prudent avoidance". To practice this policy, the Report recommended that authorities should "do whatever can be done without undue inconvenience and at modest expense to avert the possible risk".

The National Health and Medical Research Council of Australia developed "Interim Guidelines on Exposure to 50/60 Hz Electric and

Magnetic Fields" (1989) which detail acceptable exposure limits based on an objective analysis of the available knowledge at the time. The guidelines designate acceptable exposure limits from EMF's. The information suggests that a person at a distance greater than ten (10) metres from 500kv transmission lines would be within safe electric field parameters while it would be necessary to be more than 50 metres away to be within the recommended magnetic field levels.

Given the ambiguities of these calculations and measurements, further advice has been sought from the ETA relating to the various structure types from 132kv to 500kv and the easement widths required to meet the interim guidelines. In the absence of more appropriate guidelines it would be prudent that building and development activity with the transmission line easements be carefully controlled to mitigate possible health risks.

7.1.5 Visual appearance

Transmission lines along ridges and in other visually significant locations has in some instances been to the detriment of the scenic quality of an area. For example, the main Munmorah - Sydney transmission line traverses the ridges near Gentlemans Halt and intrudes upon the bushland views from the Hawkesbury River. Another transmission line traverses Fagan Park which interrupts the vistas from within the Park. Whilst little can be done about existing transmission lines, the placement of any future transmission lines should be considered in the context of the visual qualities of the area.

Within commercial and residential areas, the lower voltage electricity lines can also have a visual impact. In commercial centres outside the study area, electricity lines have been placed underground or the cables bundled to minimise the appearance of the cables.

7.2 Communication services

The use of the telephone is a popular means of communication both internally and beyond the study area. The adequacy of the service can be considered by examining the supply and demand of services and other development issues.

7.2.1 Supply

The supply of communication services within the Study Area is undertaken via two networks, namely the traditional telephone line and the

mobile network. The traditional telephone line is available to all parts of the Study Area. The service is divided into two Areas, the Sydney zone (02) and the Windsor Wisemans Ferry zone (045) which includes Wisemans Ferry, Lower Hawkesbury, Maroota and Canoclands. The existing rural and urban communities in the Study Area are serviced by twelve telephone exchanges (see Figure 7.1).

Over the last few years there has been a growing popularity in the use of mobile phones. Mobile phone services to the area are provided by 3 competing services. Digital and analogue mobile telephone services are available along the western border of the Study Area and on higher terrain to the east. To facilitate the use of mobile telephones, base/repeater stations are required to be constructed to relay the signal between uses. To achieve a greater signal range the base stations and associated towers are constructed at high points.

7.2.2 Demand

Telecom has been able to provide a traditional telephone line service to nearly all properties within the study area. The only properties not serviced are those isolated by the Marramarra National Park, where the provision of telephone lines is now considered uneconomical.

The use of mobile phones within and beyond the study area is growing rapidly. The average area is gradually being expanded by the operators as demand increases. The rugged topography of the study area creates signal blank spots impeding coverage to all areas.

It is likely that the demand for telecommunication facilities will continue to increase in the coming years. However, the ability to supply telephone services is not likely to be a constraint to future development as the supply agencies will be able to meet demand.

7.2.3 Development issues

The construction of base station towers is often the subject of community debate. Within Australia, the provision of communication services is controlled by the Federal Telecommunications Act (1991). The legislation exempts the operators from obtaining State or Council approvals when constructing facilities, such as towers. The Federal Government has prepared a draft Telecommunications National Code which requires the operators to contact the

local Council when proposing a facility and to consider any comments. The draft Code also details environmental matters which must be considered as part of the proposal.

There is also community concern over the appearance of the towers and possible health effects from the signals. The issue is multiplied as the three competing providers and generally construct their own towers, rather than sharing facilities. Hornsby Council has introduced a policy to protect and maintain the visual amenity of the Shire by encouraging facilities to be located on existing buildings, rather than towers, and promoting the sharing of facilities.

7.3 Gas services

The adequacy of natural gas to the study area is most appropriately considered in terms of supply and demand.

7.3.1 Supply

Two gas pipelines linking Sydney and Newcastle traverse the northern sector of the study area. The pipelines run parallel within the 25m wide easement and consist of a natural gas pipeline operated by the Australian Gas Light Company and a refined products pipeline operated by Caltex. Within the study area, the pipelines are located adjacent to Old Northern Road north of Forest Glen, along the southern side of Canoelands Road and through Marramarra National Park to Gentlemens Halt. The route of the pipeline is shown in Figure 7.1. Within the study area, most of the pipeline is located within the Marramarra National Park and upon lands capable of being developed for rural purposes.

Reticulated natural gas for domestic/commercial/industrial purposes is supplied to the Sydney Region by the Australian Gas Light Company (AGL). However, within the Study Area, the reticulated supply is limited to the Dural Area. The limit of mains supply at present is bounded by Redfield College on Old Northern Road, Dural and by Warrah School on Quarry Road, Dural. Residents outside these areas utilise bottle gas for heating and cooking purposes.

7.3.2 Demand

Extension of gas services, requiring installation of pressure regulators and gas mains, is usually undertaken in response to a large demand. AGL investigated the feasibility of supplying gas for heating of flower sheds, but it was found to be

commercially not viable. Since domestic services are usually reliant on an industrial supply first being laid, the extension of gas services into the rural lands is unlikely in the medium to long term.

7.3.3 Development issues

A number of activities which may affect the regional supply gas pipelines are prohibited within the gas line easements, including excavation, blasting, earthworks, altering the existing ground levels, construction or the cultivation of trees. Consequently, the pipeline easement is a constraint on development on the properties which it traverses.

7.4 Water Supply

The adequacy of water supply within the study area is most appropriately assessed by considering supply, demand and water conservation techniques.

7.4.1 Supply

Within the study area, water for households is supplied either through a pipe network or via on-site collection. Sydney Water is responsible for water reticulation within the Study Area, and serves areas south east of Glenorie (figure 7.1). Water is piped to the study area from Sydney's water supply dams, via Prospect Reservoir. Within the study area, the main water supply reservoir is located at the intersection of Old Northern Road and New Line Roads, Dural.

The reservoir serves South Dural, Cherrybrook, Kenthurst and Annangrove and a smaller elevated reservoir located at Galston Road, Dural. This reservoir is elevated to provide sufficient pressure for the properties in Arcadia, Galston, Dural and Glenorie.

As part of its Customer Contract, Sydney Water guarantees to supply water at a pressure of 15 metres head at the main tap, which is suitable for most normal domestic and commercial uses (Sydney Water, 1995).

A number of extended private services have been connected to the water mains, such as the Cobah Road Water Co-operative. These services, which are only offered for domestic use, are installed and maintained by property owners. The potential in any area for further such services is limited due to the limited reservoir expansion

capacity and topographical constraints to expanding the water supply network.

Households situated beyond Sydney Water's supply network, north east of Glenorie, are required to make their own water supply arrangements. The residents' survey responses indicate that some 80% of households outside the reticulated water supply area collect rain water and some 20% of households use spring or bore water. During times of drought or for excessive water usage, residents beyond the supply network may purchase water to fill their tanks from the water tanker operator who services the area. As expected, responses from localities serviced by Sydney Water indicate a low reliance on rain, spring or bore water. The volume and frequency of supply in these areas is more predictable and residents are likely to be less conscious about water conservation to prevent wastage.

7.4.2 Demand

The average weekly water usage for a household with three people and a garden is 5,500 litres (Sydney Water, 1995). The usage varies given the number of people using water, any pool requirements and the use of water saving devices. Figure 7.2, below, summarises the average household water usage.

Sydney Water has indicated that expansion capacity in the water supply system is limited to an additional 1000 residential dwelling equivalents. Consequently, any decisions about

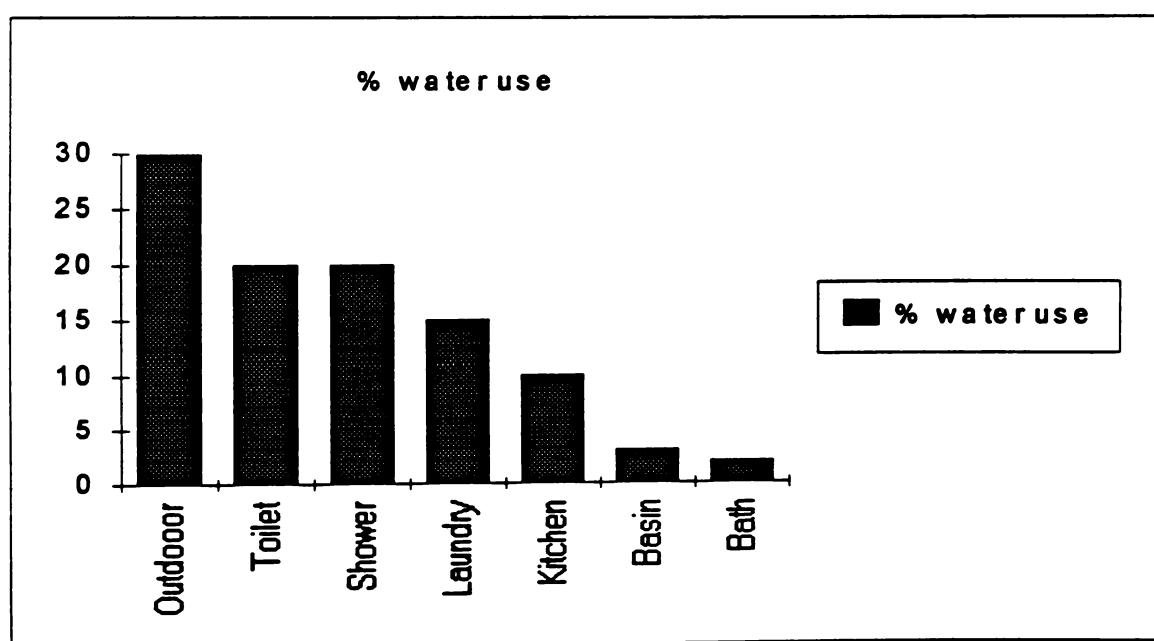
development within the study would need to be made in consultation with Baulkham Hills Shire and Sydney Water to ensure that water supply can meet the demand. Sydney Water has also advised that most of the reticulated mains are laid to their supply limit and that there are few opportunities for extension without the requirement for pumping stations and additional storage reservoirs. Sydney Water has also advised that the utilisation of the existing capacity would be best achieved along the major supply routes of Old Northern Road and Galston Road.

The possible expansion of the existing water supply network is dependent upon future development scenarios, and visa versa. Sydney Water has no plans to extend its water supply system within the study area and facilities can only be provided if the commercial viability of such services can be justified. Sydney Water's design standards do not address the supply necessary for fighting major bushfires, requiring firefighting personnel to obtain whatever supply is available from the mains in these emergencies.

7.4.3 Water Conservation

A variety of strategies addressing drought water conservation are being actively promoted by Sydney Water and Hornsby Shire Council to reduce runoff and the load on Sydney's Water Supply Network (Sydney Water 1995a, 1995c). Education of the rural community with regard to water conservation will assist residents in minimising water usage.

Figure 7.2
Average household water usage



(Source: Sydney Water 1994)

7.5 Waste Management

The adequacy of waste management services within the study area can be assessed by considering existing disposal methods, recycling, demand and future issues.

7.5.1 Disposal method

There are a variety of methods used to dispose of domestic waste within the study area. Owners of residential properties within the villages of Dural, Galston and Glenorie have their waste collected by contractors for Hornsby Shire Council. Outside this area, options include on-site disposal, either through burial or burning, the use of a private waste removal contractor or transportation to a waste depot. The majority of property owners utilise the service of a private contractor to remove waste, which is transported to the Ryde Transfer Station and then to Lucas Heights. It is estimated that the volume of domestic waste generated in the study area approaches 8,000 tonnes per annum. A tanker service is also available to collect liquid waste on demand.

The resident survey sought information on the type of solid waste disposal system used by households. The options provided were contract disposal, on-site disposal, container disposal, 240

litre bin, 55 litre bin or other method. Based on the total responses there were near equal usage of private contractors and the 240 litre bin disposal system. There may have been some confusion about these two methods as the contractors also utilise the 240 litre bin. On-site disposal and the use of a 55 litre bin also rated similar responses. Table 7.2, below summarises these results.

Similar percentages of responses were apparent in Arcadia, Dural, Galston, Glenorie and Middle Dural. In the more isolated and remote areas of Canoelands, Forest Glen, Laughtondale and Maroota the most frequent form of disposal is on-site disposal through burial.

There is one waste disposal depot located within the study area at Wisemans Ferry. The waste depot is open 7 days and accepts waste. The depot is situated in the northern extremity of the study area and is isolated from the main population. Consequently, it serves as a waste depot for local residents only. A waste transfer station is located in Withers Road, Kellyville.

Until 1993, another waste disposal depot was located at Arcadia Oval. However, this site has reached capacity and is currently undergoing rehabilitation.

Table 7.2
Method of solid waste disposal

Locality	Contract disposal	On-site disposal	Container disposal	240L bin	SSL bin	Other
Arcadia	53	23	5	47	12	13
Berrilee	19	7	2	11	4	4
Canoeland	8	11	1	0	1	5
Dural	59	17	2	49	18	10
Fiddletown	0	0	0	2	0	1
Forest Glen	1	5	0	0	0	4
Galston	64	27	4	93	42	10
Glenhaven	9	0	2	6	1	7
Glenorie	32	13	2	41	14	7
Laughtondale	0	3	0	1	0	2
Maroota	0	3	0	0	0	2
Middle Dural	32	8	0	41	21	8
Wisemans	4	1	0	0	0	6
Total	281	118	18	291	112	79

(Source: Hornsby Shire Council)

7.5.2 Recycling

Hornsby Shire Council is actively promoting recycling and waste reduction in the Shire for environmental and economic reasons. The recycling of materials decreases the demand for raw materials and reduces the cost of disposal as the volume of waste transported and tipped at landfills is reduced. The residents survey indicated that 74% (773 households) of the respondents adopted recycling methods. Hornsby Shire Council currently provides a recycling materials collection service to residents within its garbage collection area. A number of Bottle Bank collection points have been established within the area for the collection of bottles and cans, including:

Galston Oval	- Bottles, PET, Aluminium cans
Arcadia Oval	- Bottles
Dural Village shops	- Bottles, PET, Aluminium cans
RC spares, Dural	- Aluminium cans
Wisemans Ferry Tip	- Bottles
Wisemans Ferry Public School	- Aluminium cans

7.5.3 Demand

The resident survey results indicate that the majority of respondents utilise a garbage collection service provided by a private contractor. With the increasing trend towards residential land use on the rural properties, especially in Dural, Galston and Arcadia, there is increasing demand for a Council weekly garbage collection service. Hornsby Council should investigate formalising the garbage collection by extending the Garbage Collection Districts to ensure all waste is disposed of correctly and to satisfy the residents needs. The recycling service could also be extended to these areas.

7.5.4 Future issues

Hornsby Shire Council is currently reviewing its waste management strategy. It is likely that waste disposal will become the responsibility of local government rather than State Government, thereby placing extra demands on Councils. Proposals under consideration include the expansion of Council's contractor waste and recycling collection service in the rural areas. Opportunities exist to consolidate and rationalise waste collection in the rural areas with the adjoining Baulkham Hills Shire Council, through

the pursuit of a joint contract to reduce costs. Should such a service be provided, rural residents would be required to pay a garbage rate.

With the closure of Arcadia Tip and the isolated location of Wisemans Ferry Tip there is no local facility available for the disposal of residents' waste.

In 1985, a site in Calabash Road, Berribee was zoned Special Uses - Waste Disposal, however the site has not been used to date. Investigations subsequently indicated that the site, located on a ridge, was in an environmentally sensitive area and should not be developed as a waste depot. Given the topography of the study area, it is likely that other sites would have the same environmental constraints. The alternative may be the filling of disused quarries, provided that water quality in adjacent watercourses will not be affected.

In 1992, Hornsby Council considered the establishment of a recycling transfer station at Council's Galston Depot (Mid-Dural Road). However the proposal was abandoned, as the Depot may have impacted upon the amenity of nearby residential properties and an alternative site is being sought. An alternative location within a building at the Dural Service Centre has been proposed, however this proposal has not progressed.

7.6 Waste water disposal

Waste water disposal (sewage effluent and grey water) is an important issue for the study area, as incorrect disposal can pollute the watercourses with a consequent deterioration in water quality. Sewage effluent consists of the water which is flushed through the toilet, whereas grey water includes the waste water from kitchen sinks, hand basins and laundries and may contain detergents and nutrients. As indicated previously, the water quality in the local watercourses, Berowra Creek and the Hawkesbury River has deteriorated. Primary sources of pollution include effluent discharges from Sewage Treatment Plants (STP's) and from unsewered areas.

The adequacy of waste water disposal can be assessed by considering the existing disposal methods and their adequacy and future disposal options.

7.6.1 Existing disposal methods

Reticulated sewerage services are not available to residential or rural properties within the Study Area. The nearest sewer main is located within the Dural Service Centre on New Line Road, Dural, which is connected to the Hornsby West Sewage Treatment Plant. As there is no reticulated sewerage system, sewage effluent is generally disposed of through either a pumpout service, Domestic Sewage Treatment Plans (DSTP's), septic systems or composting toilets.

Grey water is usually disposed on-site. In older dwellings, grey water was directed to sullage trenches for infiltration into the soil. For more recent dwellings, all effluent and waste water is directed to the on-site treatment system and then on to the sullage trenches and to irrigation areas. Hornsby Shire Council's records indicated that 352 (DSTP's) and an estimated 2000 septic tanks have been approved in the study area. A tanker pumpout service is currently provided to 151 residential and 24 commercial properties at Galston, Dural, Glenorie and Wisemans Ferry. A breakdown of the distribution of DSTP's, composting toilets and the pumpout service is provided in table 7.3, below. Council's records do not readily enable the distribution of septic tanks to be determined. The data for the composing toilets is based on responses to the residents survey and only provides an indication of the usage of composing toilets.

7.6.2 Problems of existing disposal systems

Septic systems provide basic treatment of effluent through separation and anaerobic (oxygen deficient) digestion of solids. Following primary treatment in the septic tank, effluent is drained or pumped to absorption trenches. Domestic Sewage Treatment Plants (DSTP's), such as envirocycle or biocycle, provide secondary, biological effluent treatment under aerobic conditions and break the effluent down to a liquid which is then sprayed onto the ground. Each of these systems requires at least 200m² of non-recreational land for the infiltration of the effluent.

Research studies in South Australia and NSW have found that failing septic systems contribute significant amounts of nutrients and bacteria to surface and groundwater. The system failures were unknown to occur as a result of the underdesign of the system, an inadequate consideration of the characteristics of the soil and the inadequate consideration of the capability of the disposal site to assimilate effluent (Geary, 1992). Similarly, studies within the Hawkesbury Nepean Catchment have revealed a 40 to 60% failure rate of on-site sewage treatment systems (HNCMT, 1995). When on-site systems fail there are potentially numerous adverse health and environmental impacts including:

Table 7.3
Effluent disposal method

	DSTP	Pumpout Residential properties	Pumpout Commercial properties	Composting Toilets
Arcadia	40	0	0	0
Berrilee	8	0	0	0
Canoelands	3	0	0	0
Dural	70	1	11	1
Galston	148	82	11	1
Glenhaven	8	0	0	1
Glenorie	56	67	2	0
Fiddletown	4	0	0	0
Forest Glen	1	0	0	0
Maroota	0	0	0	0
Middle Dural	6	0	0	1
Wisemans Ferry	8	1	0	1
Total	352	151	24	5

(Source: Hornsby Shire Council)

- * parasites, viruses and other harmful components in the wastewater can cause severe illnesses including diarrhoea, hepatitis, dysentery, giardiasis and nitrate poisoning;
- * groundwater and surface water contamination;
- * impacts on vegetation; and
- * odour problems

The problems that may arise with on-site absorption systems as a result of effluent receiving minimal treatment, the soil being unsuitable for absorption, illegal plumbing and insufficient maintenance of the system. The soils' ability to absorb the waste water is dependent upon slope, soil type and soil depth. Generally, the soils associated with the Hawkesbury Sandstone are less suitable for absorption due to the steep slopes and shallow sandy soils. In areas where on-site disposal systems do not provide suitable soil absorption, the effluent should be disposed of off-site, via a tanker pumpout service.

A recent investigation into the suitability of a clay loam soil at Arcadia for DSTP's, recommended that 350m² of non-amenity area should be set aside for spray irrigation (rather than 200m²) and that the soil longevity (until nutrient saturation is reached) is 30 years (Leake, 1994). Leake (1994) also expressed concern about the potential for virus to remain in the soil. Consequently, it was recommended that spray irrigation not occur on lawns and other recreation areas.

A variation to the traditional absorption systems has been recently developed and is known as "Ecomax". The Ecomax system provides treatment in the septic tank, following which the waste water is passed into an enclosed filter system. The filter consists of a mixture of soils and earthy industrial by-products, which absorbs and chemically reacts with contaminants in the wastewater (including nutrients and disease causing organisms). The purified water then passes into the surrounding soil. It is reported that the discharged waste water is of a high standard, particularly in regard to phosphorus and nitrogen concentrations (Ecomax, 1994). However, before the promotion of this or other treatment methods, their suitability to the local conditions would need to be tested.

Effluent systems which do not require water, such as composting and chemical toilets provide an alternative solution. These systems do not rely on water supply or rely on the infiltration of liquids

into the soil. However, the systems do not dispose of grey water and require electricity to power both fans and heaters. Additionally, the dry waste collected in the system needs to be removed and disposed of in a location that will not affect the environment or human health.

The use of any disposal system inappropriate for the location can cause environmental degradation through pollution of water courses and the groundwater and could lead to the spread of bacteria and viruses.

7.6.3 Future disposal options

It is important that the effluent does not impact upon the water quality of the area and it is appropriate that suitable effluent disposal systems be identified. Two strategies need to be considered, one for the rural areas and the other for the village areas.

With regard to the rural areas, on-site disposal systems have been found to be not suitable within parts of the study area, especially areas of shallow sandy soil associated with the Hawkesbury Sandstone. Where on-site disposal is not suitable alternative systems, such as composting toilets, chemical toilets or pump-out, should be required. The provision of a reticulated sewage system in the rural areas is unlikely due to the high costs associated with servicing the low density population.

With regard to the village or residential areas, on-site disposal is no longer acceptable because of the proximity of dwellings insufficient area for on-site disposal and the pollution problems. Consequently, for residential areas the provision of some form of sewage system is required, to collect, transport and treat effluent. As with the other disposal methods, the treatment process and the discharge of treated water should not impact upon the environment. Treatment could occur within existing or newly constructed Sewage Treatment Plants (STP's).

There are two STP's in close proximity to the study area, located at Round Corner and West Hornsby. Sydney Water has indicated that the capacity of the Round Corner STP is dedicated to the village of Round Corner, and the catchment of the Plant cannot be extended into Hornsby Shire.

The Hornsby West Sewerage Treatment Plant (STP) is located to the south west of the study area. The Plant has a nominal engineering capacity of 45,000 EP (equivalent persons equates to 270 litres per person per day) with an existing load of 34,000 EP (Wastewater and Reuse Planning, 1994). The ultimate planned catchment for the West Hornsby STP has almost been reached, having regard to the population potential although the construction of a main along Georges Creek to service the South Dural area and the southern side of Quarry Road, Dural, has been contemplated by Sydney Water.

During the course of this study, Sydney Water exhibited the report "West Hornsby and Hornsby Heights Sewage Treatment Plants - Options for Sewage Treatment and Effluent Disposal" (Wastewater and Reuse Planning, 1994). As the title suggests, the report examined 11 options for the future disposal of effluent generated within the Berowra Creek Catchment. The options report recommends on an economic basis the retention and upgrading of both the Hornsby West and Hornsby Heights STP, rather than the construction of a new STP or the transfer of sewage flows to the ocean STP's and outfalls. The upgrading works proposed include either an activated sludge or high biomass process to decrease total nitrogen discharge levels to at maximum 15 mg/L. Upgrading of the STP to achieve an effluent nitrogen content of 10mg/L or 5mg/L could be achieved with greater expenditure. The options report has been on public exhibition and Sydney Water is currently considering submissions before recommending its future strategy for the region.

The load projections in the Options report predict that 46,500 EP capacity for the STP will cater for the expected "high" load until year 2021 and an allowance of 59 ha or 725 lots is made for South Dural precinct. Sydney Water, however, have advised that there is a commitment only to service currently zoned urban areas, including those on the Government's Urban Development Programme, despite allowances being made for possible additional areas in the population projections. Any additional area requiring servicing should only be considered following the environmental impact assessment of Sydney Water's preferred option for the upgrading of the West Hornsby STP, as the findings of the EIS may have implications on the ecologically sustainable development that may be allowed in the catchment.

Servicing of additional areas is therefore dependent upon the EIS which is to be prepared and placed on public exhibition, prior to a final decision being made regarding adoption of the appropriate improvement measures for the West Hornsby STP. Accordingly, additional areas may not be serviced in the short term, while the opportunity to service additional areas in the long term is dependent upon the completion of the above mentioned environmental impact assessment, implementation of the works and ongoing water quality monitoring. It would be appropriate to continue water quality monitoring following the upgrading works to quantify any improvements in water quality and the aquatic ecosystem.

Sydney Water, in a submission to this study, indicated that the provision of sewer facilities to the villages of Galston, Glenorie and Dural will only be undertaken if a commercial rate of return can be achieved. Financing options that may enable these schemes to proceed are currently being investigated. However, until there are definite funding arrangements, Sydney Water will not be investigating any new sewer schemes.

Council also sought Sydney Water's attitude towards the construction of private STP's to service the village areas. Sydney Water indicated that they are currently determining an official position on this issue although it is understood that there is concern that it may have some responsibility towards maintenance of private STP's.

The disposal of the treated waste water from STP's has traditionally been discharged into the nearest watercourse. As part of the Rouse Hill Urban Release Area, the treated waste water is being reticulated back to the residential properties in a separate water line for use in gardens. This type of system could be established in the rural areas as part of the construction of a complete effluent disposal and reuse system although the density of population could make reticulation costs prohibitive.

The Environmental Protection Authority has prepared draft guidelines for the use of treated effluent by the irrigation of crops and pastures (EPA, 1995). Treated effluent from the STP's located on the periphery of the study area could be transported to properties within the study area for irrigation.

7.7 Drainage

This section will consider built drainage networks within the study area. The natural drainage pattern of the study area and water quality issues were previously described in Section 4.3 of this report. As noted, the study area is located in the catchments of Berowra Creek and the Hawkesbury River. Consequently, both natural watercourses and constructed drainage lines transport runoff and pollutants to these water bodies.

7.7.1 Existing network

Drainage within the study area is not currently a significant issue as the majority of properties within the study area are not connected to a stormwater drainage network and stormwater is not concentrated as is the case in more urbanised areas. Instead runoff is absorbed on-site, directed to roadways or flows in natural watercourses. Residential properties within the villages of Galston and Glenorie are serviced by a stormwater drainage network. The pipe network collects runoff from roofs, driveways, road and other impermeable surfaces, and provides a transport route to discharge points at nearby watercourses.

Glen Street at Galston was subject to drainage constraints with the yards of properties subject to inundation. This was partly the result of upstream residential development increasing the area of impervious surfaces and therefore runoff combined with sedimentation and weed invasion of the watercourse which restricted water flow. To rectify these problems, Hornsby Council acquired four properties and constructed an overland flow path, and then sold the properties.

Additional works have been proposed upstream including the construction of another overland flow path between The Knoll and Gardiner Road to resolve drainage concerns in this subcatchment. A number of drainage easements also need to be established in the vicinity of Galston shops to enable confinement of stormwater drainage to drainage flow paths. Further work is required in this area to overcome existing drainage concerns.

7.7.2 Alternative drainage methods

The absence of a formal stormwater network is typically not a constraint to the development of existing rural properties as there is sufficient land area to absorb the majority of runoff and there is little that is damaged by storm flows. However, the expansion of existing residential areas or development of new residential release areas should be accompanied by drainage infrastructure. The traditional piped drainage network effectively transports runoff from hard surfaces to surrounding watercourses. However, it also changes the natural hydrological cycle by decreasing infiltration and groundwater discharge, increasing the volume and velocity of runoff and destroying natural watercourses and wetlands. In recent times, urban development has incorporated water sensitive drainage design strategies. Publications such as "Better Drainage" (Land Systems EBC, 1993) promote alternate, innovative approaches to drainage, including the use of drainage networks as recreation areas, conservation areas and pedestrian links. Prior to the construction of any drainage network, it is necessary to consider the local capability, recreation needs, environmental impacts, existing hydrological cycle and drainage network and determine the appropriate strategy. The following general principles should be considered in the planning of drainage networks within the study area:

- * natural watercourses should be utilised and not piped;
- * stormwater discharge should reflect the natural situation in terms of quality, quantity and volume, through the use of dispersion, detention and velocity control measures;
- * multiple use drainage system incorporating wetlands should be encouraged in suitable locations.

In recent years, Hornsby Shire Council has reconstructed road edges in the rural areas utilising grass verges which maintain the rural character of the area and reduce runoff by increasing infiltration. A number of these principles are explained and illustrated in Hornsby Council's draft Urban Drainage Design Manual (Edition 2).

Runoff can also be reduced through the use of pervious surfaces and the collection of roof water in water tanks for garden use.

7.8 Infrastructure Conclusions

The provision of infrastructure services in the rural lands has been limited by both the topographical constraints of the area and the isolation of individual settlements. A Planning Strategy for the area should ensure that development strategies are formulated in close liaison with the main service providers of electricity, telecommunications, water supply, waste disposal, and sewerage and drainage services.

Electricity is available to most properties within the study area although some properties on the outskirts of Arcadia, Fiddletown and the Lower Hawkesbury River are not connected. In recent years, the possible health effects and visual impact of high voltage power lines has been debated and a policy of prudent avoidance should be adopted for development adjacent high voltage power lines.

Telecommunication services are available to all but the most isolated properties within the study area, through either the traditional telephone line or by mobile phones. The ability to connect to a telecommunication service is not a constraint to activities in the study area. The proliferation of mobile phone base station towers has caused community debate over possible health effects and the visual appearance of the structures. Where possible, the competing suppliers should be required to share facilities and local equipment on existing buildings.

Reticulated gas services are only available to the southern extremity of the study area and it is unlikely to be extended due to the low population density. Residents utilise gas for domestic use supplied in refillable bottles. The Sydney-Newcastle gas and petroleum products pipeline traverses the northern part of the study area. To maintain access to the pipeline and to minimise the risk of damage, a buffer to the pipeline should be maintained.

A reticulated water supply service is available to the majority of properties south of Glenorie. Opportunities beyond the current supply area are limited due to the relative elevation of the reservoirs and the area to be serviced. The expansion of the network would require the construction of pumping stations and reservoirs which will only be provided if commercially viable. Additional development opportunities within the supply area are also limited to an additional 1,000 dwelling equivalents, distributed

between both Hornsby and Baulkham Hills Council areas. The utilisation of this capacity would be best achieved along the major water supply routes of Old Northern Road and Galston Roads.

Residents beyond the reticulated supply service rely on the collection of rain as spring water or a water tanker service. Water conservation strategies should be encouraged throughout the study area to reduce runoff and the demand on Sydney's water supply network.

The majority of waste generated in the study area is transported out of the area to Ryde Transfer Station and then to Lucas Heights. Contractors for Council currently collect waste from the residential villages of Dural, Galston and Glenorie. Residents outside the villages are required to make their own arrangements with contractors, or other means of disposal.

Hornsby Council promotes recycling and waste reduction to reduce the cost of disposal transportation, producing new products and establishing new waste collection depots. Opportunities exist for the establishment of waste and recycling collection services with the neighbouring Baulkham Hills Council to share the cost of servicing the isolated communities.

The steep topography and sensitive waterways restrict opportunities for the establishment of land fill sites within the study area. The filling of disused quarries may be an option, provided that the surrounding environment is not effected.

The disposal of effluent and waste water has been identified as a source of pollution in the waterways. Reticulated sewerage services are presently not available to residential or rural properties within the study area. Residents rely on the disposal of effluent and waste water through pump-out, septic systems, domestic sewerage treatment plants or chemical and composting toilets. The provision of a collection service to the village areas should be continued and a reticulated sewerage system considered in the longer term.

The sewage treatment plants surrounding the study area do not have the capacity to service the general study area. Without the provision of sewage collection facilities, the development potential of the study area is limited. The provision of sewer facilities to the villages of Galston, Glenorie and Dural could only be undertaken if commercially viable. The use of alternative disposal systems should be considered where it can be demonstrated that they will not impact on the environment.

Stormwater drainage is only provided within the villages of Galston and Glenorie. Stormwater run-off on rural properties is absorbed on-site, directed to farm dams or flow off-site. Improved drainage systems are required in the village areas to reduce the risk of property damage. These systems should generally not be the traditional piped network but reflect the natural drainage patterns and include detention basins, overland flow paths, wetlands and recreational areas.

CHAPTER EIGHT - TRANSPORT SERVICES

Transport services influence the development of both the rural and urban areas of Hornsby Shire and equally the lifestyle of its inhabitants. Travel has remained, over time, an important aid in communication. In order to access work places, schools and shops and participate in many social and recreational activities, people require mobility. Mobility and the time spent travelling are dependent upon the location of travel destinations, physical and geographic constraints, and the mode of transport.

Future transport demands for the study area will be determined to a large extent by the size of the rural community, the age structure and income of its residents and the arrangement of land uses. The provision of transport services is influenced by both demand and economic considerations. As well as local transport issues, the study area will also be affected by regional transportation strategies and development.

This chapter will consider regional transport issues, public and private transport, and traffic management within the Rural Lands.

8.1 Regional transport issues

Prior to the consideration of local transport services, it is appropriate to establish the broader regional context and examine those issues that influence the rural lands of Hornsby Shire. The two main regional issues which affect the study area are the State Road Network Strategy and the development of the North-West Sector.

8.1.1 State Road Network strategy

The State Road Network Strategy identifies a strategic road network for the Greater Metropolitan Area, consisting of a hierarchy of major routes and corridors, which support both inter-regional movement and inter-urban routes. The aspects of the strategy which are pertinent to the study area include support for regional development through the development of strategic links based on economic and community transport needs and the improvement of bus access to selected centres and transport interchanges. This strategy is currently being refined and includes the investigation of an orbital route to the west of Parramatta which would link Liverpool, Blacktown and Hornsby. Determination of the final route will be subject to environmental assessment and extensive community consultation

and could traverse the rural lands at some point. The planning horizon for this project is between 20 and 30 years.

One route under consideration is a road passing through the rural areas, across Berowra Creek via a high level bridge to a location north of Hornsby, linking with the Wahroonga-Newcastle Expressway. Should this route be constructed, the likely implications for the study area would include greater access to the area and surrounding regional centres, increases in traffic and congestion, environmental impacts, and increased pressure on the conversion of rural lands to urban lands given increased accessibility.

8.1.2 North West Sector

The commercial and residential development of Rouse Hill is likely to have an indirect impact on traffic movements in the study area. The estimated population for the Rouse Hill area is some 250,000 persons. An integrated Transport strategy is being developed to provide alternate links to the North West Sector. These include parallel routes to Windsor Road along Old Pitt Town Road and Pitt Town Road which will improve accessibility between Windsor, the north west sector and northern Sydney.

Residents of the North-West Sector will also journey across the study area to access centres such as Hornsby, Pennant Hills, Epping and use the Wahroonga-Newcastle Expressway, thereby increasing traffic volumes in the study area.

8.2 Public transport

Public transport is an essential social and community service. The provision of public transport should be promoted where it can be demonstrated that it provides an efficient use of available transport resources. Public transport serves two basic markets, those who use it by choice and those who are captive users (the aged, children, youth and the disadvantaged). The provision of public transport is necessary to ensure the mobility of public transport dependent groups. Public transport within the study area is limited to bus and taxi services.

8.2.1 Bus Services

Bus services in the study area are provided by two private bus companies. The Glenorie Bus Company provides services which link the study area to Castle Hill, Eastwood, and the Main Northern Railway line at Pennant Hills Station. These services are indicated in Table 8.1. The

week day bus services between Pennant Hills and Dural, Glenorie and Galston commence at 5.30am and cease after 8.30pm, whereas bus services between Pennant Hills Station and Berribee operate between 6.00am and 7.00pm.

Consequently, during the evening periods, mobility is restricted to taxi services or private vehicles. The Hawkesbury Valley Bus Company also operates in the study area and services predominantly the local schools between Wisemans Ferry and Canoelands.

Other routes operate on school days and pick up/deliver school children to a range of primary and secondary schools in the study area. A bus interchange was completed adjacent to the Dural Primary School on Old Northern Road in 1994 and provides a link between bus routes for school children traversing the surrounding area. The transportation of school children is the major source of patronage and income for the bus companies.

Bus and rail interchanges have been established at Pennant Hills and Hornsby railway stations and are an important part of the public transport network. They provide a convenient focal point for bus routes, enabling the efficient transfer of passengers to rail or other bus services. The interchanges also form an integral part of these centres and due to their central location, provide maximum convenience to passengers. Four percent of the workforce of the study area travel by rail and only 1% of the workforce commute by bus. These low figures are understandable given

the sparsity of population and the poor provision of public transport. Public transport patronage in the study area is understandably low compared to the Hornsby Shire average of 15% for rail, 3% for bus and also the Sydney region of 11.6% for rail and 7.5% for bus (Figure 8.2) (ABS, 1993).

It is unlikely that public transport services within the study area will improve in the short to medium term, unless the population and demand for these services increases. Similarly, alternatives to bus transport such as light rail, are unlikely to be constructed unless the population significantly increases. This is supported by investigations into busways and light rail services in Canberra, which were found to be uneconomic despite a higher density and larger population than the study area (NCDC, 1986).

8.2.2 Taxi Services

There are no taxi ranks within the study area. Taxi's can be called for pickups in the study area and are available in Castle Hill and Pennant Hills for journeys to the study area.

8.3 Private Transport

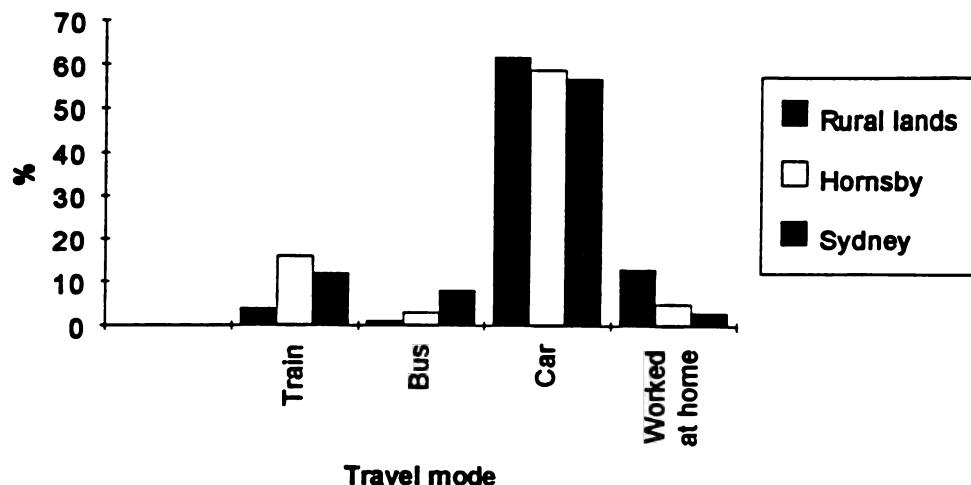
Private transport within the study area consists of individuals walking, riding horses or bicycles and the use of cars and helicopters. The provision of pedestrian bicycle and horse riding facilities in rural areas can provide important alternative transport routes and can minimise conflicts with vehicles.

**Table 8.1
Bus Services**

Services	Weekdays		Saturday		Sunday	
	No. trips to	No. trips Return	To	Return to	To	Return to
Glenorie-Pennant Hills	16	16	8	7	4	4
Berrilee-Pennant Hills	7	5	0	0	0	0
Galston-Pennant Hills	15	17	8	7	4	4
Dural-Pennant Hills	25	21	9	8	4	6
Dural-Eastwood	1	0	0	0	0	0
Round Corner-Castle Hill	9	6	0	0	0	0

(Source: Derived from available bus schedules)

Figure 8.2
Mode of travel to work



8.4.1 Pedestrian, bicycles, horses

Pedestrian

Pedestrian movement within the rural parts of the study area is limited when compared to urban areas, because of the long distance between properties, commercial, recreation and social facilities. Pedestrian movement is more common in the village areas where the distance to facilities is less.

Pedestrian links in the study area are focused in the village areas to provide access to the local schools, parks and shops. The limited opportunities for pedestrian movement is highlighted by the journey to work statistics. Four percent of the workforce within the study area walk to work which is similar to the Shire average of 2.7% but lower than the Sydney average of 6.7% (ABS, 1993). Walking along firetrails and tracks within the bushland areas are also popular recreational activities for residents and visitors.

Footpaths have been constructed in the residential villages of Galston, Dural and Glenorie. In 1995 a pedestrian footpath was constructed between Galston Village shops and Rowland Retirement Village to provide the elderly residents of the village with a safe and easy route to the shops and community facilities.

Demand for footpath facilities beyond the villages is limited, as the distance between properties and attractions is too great, except for the fit or recreational walker.

Bicycles

The bicycle is a significant and environmentally sound means of transport for local trips in rural areas, particularly for students. The use of bicycles within the study area is generally restricted to school children and adult recreation. School children ride bikes to school, shops or for visits. Two popular adult recreation rides exist within the study area. The first involves riding along Old Northern Road to the Hawkesbury River and beyond. The second is a circular route from Hornsby to Galston via Berowra, involving the Pacific Highway, Berowra Waters Road, Bay Road, Arcadia Road and Galston Road.

Off road recreational rides, using mountain bikes, are becoming increasingly popular. Cyclists utilise fire trails to ride through the extensive bushland within the study area. A children's bicycle track has also been constructed within Fagan Park, Galston, which is used by visitors to the park.

Pedestrian and bicycle routes should follow logical routes that link destinations such as sporting facilities, playgrounds, schools and routes to adjoining areas. The Draft Hornsby Bicycle Plan (Travis Morgan, 1988) identified a need for a formalised network of off-road cycle paths within the study area to provide links with local schools.

Horse riding

Horse riding is a popular recreational mode of transport within the study area. There are no formal horse trails within the study area, instead

riders utilise road verges, nature strips, fire trails and bush tracks. Due to the popularity of horse riding, the establishment of formal horse riding routes should be considered as part of the planning strategy for the area.

8.3.2 Car

Car ownership in the study area now averages almost 2 cars per household, as a consequence of the dependence on the car and improved living standards which have resulted in greater affordability of motor vehicles (ABS, 1993). A comparison of age structure and household income trends suggests that the car ownership rate is likely to remain at current levels in the short to medium term.

The car is used for the majority of journey's to destinations within and beyond the study area, including those to shops, work, social and sporting engagements. The journey to work statistics highlight the high dependence of the workforce on the car. A total of 2833 persons or (62%) of the workforce in the study area use motor vehicles to travel to work (ABS, 1993). This dependence is similar to the average figure for Hornsby Shire (59%) and the Sydney region (57%) and is understandable given the sparsity of the population and the lack of public transport.

8.3.3 Helicopters

Although there are no formal facilities for air travel in the study area, the use of light aeroplanes and helicopters has been observed. The only regular air service is the float plane flight from Sydney to Berowra Waters and return.

The use of aeroplanes is limited by the need for take off and landing runways at either end of the journey, whereas helicopters have the advantage of being able to land in most open areas.

It is anticipated that the demand for helicopter transport will increase due to increasing road travel times and the establishment of additional heliports in Sydney and other locations. For example, the study area is 90 minutes away from the Central Business District by road but only 20-30 minutes by helicopter. The cost of air transport is high which limits its demand, although it may be cost effective for business activities. The transportation of tourists to and from the study area by helicopter may also be sought in the future.

8.4 Traffic management

The road network within the study area has evolved without predetermined structure or form and consideration needs to be given to the adequacy of the road network and traffic management principles. Traffic management is the organisation, arrangement, guidance and control of traffic; including pedestrians, cyclists and all types of motor vehicles. The primary aim of traffic management is to provide for the safe, orderly and efficient movement of persons and goods to protect and enhance the quality of the local environment. (Underwood, 1991). The primary components of traffic management which will be evaluated within the Study comprise the road hierarchy, traffic pattern and road capacity.

8.4.1 Road hierarchy

The location of roads within the study area has developed partly as a result of the topography of the area. Historically, roads were constructed along the main ridges, from which other roads radiated along other ridges, spurs and valleys. The historical road pattern remains today, with Old Northern Road and Galston Road being the primary access routes to and through the study area.

To apply traffic management principles to a road system, it is necessary to develop a hierarchy of roads which can then be reinforced by traffic management techniques. This approach provides a basis for the planning and upgrading of the road network. It also allows improved distribution of limited resources throughout the community and greater certainty for the residents. For the purpose of this report, the functions of roads have been classified as state, regional, collector and local (Figure 8.3).

State roads are the major transport corridors through the region and include Old Northern Road, New Line Road and Galston Road. These roads link the residents of the study area with the surrounding region and provide the main route for through traffic. These roads are used by heavy vehicular traffic and long distance travellers and are subject to high traffic volumes. State roads are maintained by the Roads and Traffic Authority, whereas the other classes of roads are maintained by Hornsby Council. As these roads serve heavy vehicles and high traffic volumes they are generally wider and constructed to a higher standard to improve safety.

Regional roads are also important transport corridors. Examples within the study area include Arcadia, Bay, and Mid-Dural Roads. These roads serve both local residents and through traffic, providing access to shops in the area and to adjacent areas. Regional roads are constructed to a similar standard to State Roads, although traffic volumes and speeds are lower.

Arcadia Road and Bay Road were formerly classified as a State Roads, however the RTA has now transferred the control of these roads to Hornsby Council. Part of the State Road included sections of Bayfield and Blacks Road which bypassed Arcadia Road between Galston and Arcadia. The route includes an unmade section of Bayfield Road adjacent to Fagan Park. The route is zoned Special Uses B (Transport Corridor) and the road reserve is generally 30m wide. The section of Arcadia Road that the transport corridor bypasses is the less direct, more heavily trafficked route, zoned Rural B and has a road reserve width of 20m. The function of the section of Arcadia Road which is bypassed between Galston and Arcadia should also be reviewed.

Collector roads primarily serve local residents and have the function of distributing traffic from local roads to state and regional roads. Examples within the study area include Quarry, Canoelands, Singleton, Knights, Carters, Cobah and Cairnes Roads. These roads are predominantly narrow two lane roads with gravel verges.

Local roads have the primary function of providing access to individual properties and cater for low traffic volumes. Local roads include the minor streets, roads and cul-de-sacs in the rural areas and in the residential villages of Galston and Glenorie.

A number of roads throughout the study area, whilst being illustrated on plans, are not constructed, particularly where they span creeks or gullies. Despite these "paper" roads not being constructed, their retention would allow for future extension and upgrading if required.

Increasingly, the State and Regional roads also serve the function of tourist roads for Sunday or visitor drives. Roads which serve this purpose include Old Northern, Galston, Arcadia and Bay Roads.

8.4.2 Traffic pattern

The manner in which traffic flows through an area allows an assessment of whether the roads are performing in accordance with their function and capacity. The traffic pattern is measured by determining the amount of traffic passing a given point on the road system in a given time. The results are usually expressed as average annual daily traffic (AADT).

Within the study area, traffic volumes have only been measured for the state and regional roads. The available traffic pattern information for 1989 to 1993 is summarised in Figure 8.3. The figure illustrates that traffic volumes decrease in the northern parts of the study area. The 1993 AADT for New Line Road and Old Northern Road south of Dural average between 15,000 and 21,700 vehicles per day. The AADT decreases north of Dural, as illustrated for Old Northern Road south of Middle Dural where between 7,800 and 9,400 vehicles per day were recorded. The AADT along Old Northern Road decreases further between Maroota and Wisemans Ferry where 2,000 vehicles per day were recorded (RTA, 1995).

Along Galston Road the AADT varies from 9,340 vehicles at Dural, to between 6,124 and 7,823 vehicles at Galston shops to 4,764 vehicles at Galston Gorge.

As well as considering traffic movements within the study area, it is appropriate to consider traffic movements in the surrounding region. The main access to the study area is via New Line, Old Northern, Galston, Wisemans Ferry, Cattai Ridge and Bay Roads. Access from the south of the study is generally not constrained by topography, however the alignment and width of both Old Northern and New Line Roads varies between single and dual lane roads.

From the rural area, road access to the east is constrained by Berowra Creek where Galston Road passes through Galston Gorge. This road has a narrow alignment, and a series of hair pin bends, steep grades and narrow bridges. Further north, Berowra Waters - Bay Road also have a narrow alignment and a vehicular ferry crossing Berowra Creek. Vehicle movements on these roads is limited to light vehicles and small trucks and buses.

Further to the north, vehicle ferries cross the Hawkesbury River at Sackville, Lower Portland, Webbs Creek and two at Wisemans Ferry. The road approaches to these river crossings are steep,

narrow and winding due to the dramatic descent from ridges. Cattai Ridge Road and Kenthurst Road to the west are rural roads which generally follow ridges. Their alignment narrows where Cattai Creek and other watercourses are crossed.

As a consequence of the limited access to the study area, the State roads, exemplified by Old Northern Road, are not subject to high through traffic volume. Regionally, north-south vehicle movements are concentrated on the F3 - Wahroonga-Newcastle Expressway and Pacific Highway located to the east and to the Putty Road, located to the west of the study area. However, Old Northern Road is becoming increasingly popular with visitors and tourists accessing Wisemans Ferry, the Hawkesbury River, St Albans, Wollombi, Spencer and areas north of the study area.

8.4.3 Road capacity

The road capacity measurement takes into consideration both traffic carrying capacity and environmental capacity. Traffic carrying capacity provides a means of measuring the effectiveness of a route to accommodate moving traffic along roads and at intersections. The "level of service" of a road is used to describe operational conditions in a traffic stream, where at level of service "A", traffic is free flowing and at level of service "E", traffic flows are interrupted (Underwood, 1990).

The environmental capacity of a road network relates to the volume of moving vehicles which can be accommodated within acceptable environmental standards. No standard has been adopted for rural roads, however in residential areas a standard of between 3,000 and 4,000 vehicles per day for local or collector roads is considered acceptable (Underwood, 1990). Environmental standards are affected by factors such as traffic speed, percentage of heavy vehicles and the distance of noise sources from residential dwellings. Consequently, residents living adjacent regional roads such as Galston and Old Northern Road have different environmental expectations to those living adjacent local roads.

The two way traffic volumes in the majority of the study area peak at New Line Road with 22,000 vehicles per day, declining to 8,000 vehicles per day at Dural and Galston and 2,000 vehicles per day at Wisemans Ferry.

An "A" level of service changes to a "B" level of service when 1,700 vehicles per lane per hour is

exceeded. Consequently, as the total two-way average daily movements for roads north of Dural are less than 8,000 or 400 per lane in peak hour, an "A" Level of Service can be expected. The peak traffic movements along New Line Road, of 22,000 vehicles per day or 1,100 vehicles per lane in the peak hour, also represents an "A" level of service. It is noted that the level of service declines in the urban areas adjacent the study area as a result of the influence of urban traffic.

Traffic counts have not been recorded for collector and local roads in village areas. However, it is likely that traffic volumes are less than 3,000 to 4,000 vehicles per day. This assumption can be made for the villages where the size of the villages are small and do not generate large volumes of traffic or attract through traffic.

Rural roads may be several kilometres long but service a limited number of properties. Often rural roads are not through roads due to topographical barriers. The impact of traffic on residents in rural areas is different to that experienced by urban residents as houses have greater setbacks from the road, providing attenuation of traffic noise and exhaust fumes. To encourage the separation between houses and vehicular traffic a 15m building setback applies to most State and Regional roads within both the villages and rural parts of the study area.

Another factor used in assessing road networks relates to the treatment of intersections. In a number of instances, intersections may have poor sight distances which reduces the safety of the intersection. The design of these intersections including the installation of traffic calming measures, may be warranted. Intersections are focal points within the road hierarchy and will come under greater pressure for design review with any increases in traffic volumes.

8.4.4 Road network improvements

Sections of New Line Road, Galston Road and Old Northern Road are planned to be upgraded in the short to medium term by the RTA. This work will involve significant capital works and require considerable lead time in planning the strategic development of the road network. A roundabout has recently been constructed at the intersection of Mid Dural Road and Galston Road to improve the level of safety.

To reduce vehicular conflict, it is good planning and traffic engineering practice not to allow

individual properties to have direct access to State and regional roads subject to high traffic volumes, especially in residential areas as the accessways increases the number of conflict points. However, the initial planning and rural subdivision of the study area occurred prior to the dominance of the motor car and the subsequent subdivision of these large allotments has resulted in a large number of properties directly accessing the main roads. The subdivision of these properties into smaller allotments would increase the number of driveways and consequently the potential for vehicle conflict. As traffic volume increases along Old Northern Road, additional advisory speed signs, line marking and improvements to the alignment may be necessary to improve safety.

Collector roads do not generally allow through traffic, due to constraints imposed by the terrain, thereby forcing traffic onto the state and regional roads. Expansion of the collector and local road systems is not proposed in the short term. However, existing transport corridors along Arcadia, Bay and Berrilee Road axis' have been identified for upgrade in the medium to long term.

The road conditions of the local and collector road network are variable, although all maintain a high level of service. In Galston Village, the road alignment and width generally reflects the road hierarchy. Substantial works have been undertaken to improve the collector road network through line marking and signage, resulting in a better delineation of routes. Improved delineation of collector roads into the remaining rural areas may be required in the future to ensure appropriate standards of access are maintained.

The traffic management within the business precincts at Galston and Dural requires review. The main traffic conflict arises between vehicles entering and leaving the relevant shopping centres and those on the through roads. Measures to separate the two traffic streams reduce the number of access points and restrict turning across on-coming traffic should be considered.

The remaining roads in the study area have the capacity to accommodate greater volumes of traffic, but may require pavement rehabilitation and improvements to their road geometry in order to carry larger loads. The Dural Village Study (Hornsby Shire Council 1993) recommended the construction of a roundabout at the intersection of Galston Road and Old Northern Road and the

widening of Old Northern Road to a 4 lane dual carriageway in appropriate areas.

Local Area Traffic Management (LATM) Schemes can be introduced for residential areas which experience high volumes of through traffic. These traffic management solutions are not necessary for the rural villages which have a small size and are not subject to through traffic.

Where new residential subdivision occurs, the design of local roads should promote low traffic speeds. This will reinforce the road hierarchy and maintain the environmental capacity of the area. In existing areas, where wide local roads could encourage high speed, traffic control measures should be implemented to reduce vehicle speed.

8.5 Transport Services Conclusions

Car based transport is expected to remain the main travel mode in the rural areas of Hornsby and Baulkham Hills Shires. The existing public transport system provides limited opportunities for residents to access shopping and employment centres in the study area and the surrounding region. While the level of patronage within the workforce is low, opportunities exist to improve public transport service links to key transport interchanges at Hornsby and Pennant Hills.

An integrated approach to transport planning is required to achieve maximum economic benefit and to provide acceptable levels of mobility for all sectors of the community. Plans could include encouraging alternate transport modes through the implementation of pedestrian and bicycle networks within the study area to augment access to public transport and recreation facilities. Particular attention should be given to poor public transport to the study area during late evenings and weekend periods.

The road network within the study area is consistent with traffic management principles. The road hierarchy, combined with relatively low traffic volumes, obviates the need for a large scale traffic management program. The hierarchy status of Arcadia Road, between Galston and Arcadia, should be reviewed to reflect its continuing role as a regional transport corridor.

Traffic within the study area is provided with a high level of service on all types of roads. However, this network will experience greater pressures through increased rural and residential development particularly in the Galston and Dural area and from traffic associated with the North West Sector.

CHAPTER NINE - VISUAL ENVIRONMENT

The rural lands of Hornsby Shire have a range of visual qualities and characteristics ranging from among the most spectacular in the State to more modest. The landscapes of this area are changing under the influence of natural processes, land use and pressure for settlement pattern changes. This is a normal process to which most settled landscapes are subject.

Among the landscapes of the area are some already recognized as of State or regional scenic significance in draft amendments to State Regional Environmental Planning Policy No. 20, Hawkesbury Nepean River. Recent community involvement has also indicated that the scenic qualities, natural environment and rural atmosphere of the area are other valued attributes. Each of these factors contributes to the scenic values of the area.

Changes to the land use and settlement pattern of the rural lands have the potential to alter the visual quality of the area in the future. These changes will occur both naturally, as a result of economic forces and technological changes in the rural environment, and as a result of future planning and ongoing development of the area. To conserve the desirable values of the rural lands, it is necessary to identify the qualities which give the area its scenic and rural character. The effect of natural and planned change can then be evaluated to determine whether the valued scenic qualities of the area can be retained.

All landscapes deserve appropriate attention to the conservation of their visual qualities. The means to achieve this depends on the visual character of the landscape and decisions as to whether this character should be retained or altered in the future. Alteration could involve rehabilitation, adaptation, enhancement or change to another character. A change in character should also enhance and complement the character of the area.

This chapter describes the methodology used to assess visual quality and character of the rural lands in Hornsby Shire. It identifies the overall landscape qualities of the area and the views and vistas of the main road and river corridors. It also identifies and locates areas of particular scenic character and assesses the potential effect of change on this character now and in the future.

9.1 Methodology

The methodology adopted for this study, follows the method used as part of the review of Sydney Regional Environmental Plan No. 20 - Hawkesbury Nepean River, which related to the scenic quality of the river landscapes (Travers Morgan and R. Lamb 1994). The methodology was modified and simplified, however, to suit the smaller range of landscapes of the rural lands. Part of the area in the Lower Hawkesbury Valley, such as the Wisemans Ferry to Spencer, Spencer to Berowra Creek and Berowra Creek landscape units have already been considered in detail in the earlier study. Consequently, no further description of the overall scenic quality of these areas was undertaken as part of this assessment. However, the character of certain areas within these units was thought to be of local significance and these are separately described later. The views, vistas and issues relating to the future scenic quality of the area are also documented.

The evaluation of the visual environment comprised two major parts. The first comprised the classification and documentation of the scenic quality and character of the rural lands. The second consisted of consideration of changes to the scenic quality of the area occurring now and potentially in the future, with recommendations as to the conservation of scenic quality.

9.1.1 Documentation of scenic quality and character

The first part of the methodology, documentation of scenic quality and character, comprised three sub-tasks. These were:

- * identification and description of the physical and cultural qualities of the landscapes of the rural lands;
- * documentation of the viewers experience in the area by locating the view lines and vistas in the main road and river corridors of the area and key locations in Marramarra National Park; and;
- * location and identification of areas of particular scenic character.

The assessment was directed at cultural landscapes of the rural lands and therefore did not describe or document the visual qualities of the natural landscapes within bushland reserves and Marramarra National Park. The visual qualities of these areas were considered to be adequately conserved at present by existing management policies.

Landscape classification

The visual qualities of rural landscapes are closely correlated to physical and biological attributes. The landscape is first classified on biophysical criteria. The classification is then extended to smaller units.

The classification process is undertaken in steps which are designed to build up an explicit descriptive classification of the landscapes. At each step the description becomes more detailed. Each stage provides a base line description against which landscapes at succeeding stages are judged.

There are a number of elements used in assessing scenic quality. The elements are called descriptors because they become part of the descriptions of the landscapes identified at each stage. They change slightly in their character according to the stage of classification. Table 9.1

details the stages of the classification process and the descriptor elements used at each stage.

Identification of visual corridors and routes

The landscape is experienced, not as though it was a map, but by movement and involvement. The location and character of visual corridors (such as the Hawkesbury River, Galston Road, Arcadia Road and Old Northern Road) were assessed and their view points, vistas and visual character described. Key viewing points on major tracks and fire trails were also identified in Marramarra National Park. Visual corridors are places of special visual sensitivity.

Following the identification of the landscape units and corridors, each was visited and viewed from within, and from the surrounding landscape, important view points, culturally important places and recreation sites. A character description was developed for each landscape unit.

Table 9.1

Descriptors derived from the scenic quality elements for each stage of the landscape classification process

Elements	Land Sub-systems	Landscape Units	Character Description
Landform	Geomorphology	Topography	Landform
Land Cover	Ecosystems Soil landscapes Land Cover	Habitats Vegetation Clearing Pattern	Plant Communities Plantings/Crops
Cultural Landscape	Settlement Pattern Land Use Systems	Development Pattern Agricultural Systems Settlements	Development Density Scale Cultural Elements Building Forms/Types
Water Form	Water Form	Rivers and Creeks Water Bodies	River Landmarks Important Places Land-water Edges Recreation Sites
Scenic quality	View Sheds Visual Elements	Visual Qualities Abstract Qualities	View Points, Vistas Visibility Landscape Character

Areas of scenic significance

The output of the method was a group of landscape units and corridors of potential scenic significance. The next step was to assess and document their significance. Among these were some which have already been identified to be of high scenic quality and significance (eg. Hawkesbury River and Berowra Waters landscapes). The remainder were assessed in terms of their significance to the State, region or local environment.

Significance beyond the region: High scenic quality landscapes should be protected as a matter of priority because their significance extends beyond the region. Landscapes of this quality pass the first criterion for significance; significance beyond the region, at a State or possibly National level.

Regional significance: Landscapes which passed this criterion were significant within the full range of landscapes present in the region but not beyond that level. Special inclusion criteria were added to the judgment of regional significance to acknowledge the importance of how people, especially the regional community, experience the landscape. For example, regional landscape features, even though they may be of modest scenic quality, may be of high visual sensitivity because they are familiar and frequently seen by the regional community and travellers. Special inclusion criteria, includes

- * regionally characteristic landscapes of high visibility
- * landscapes of high sensitivity
- * landscapes of low visual absorption capacity
- * landscapes representative of the region
- * landscapes regionally rare
- * landscapes which are vulnerable or isolated

Local significance: Landscapes which passed this criterion were significant within a locality by virtue of being representative of a scenically distinctive landscape character of the Shire but not beyond that level. Special inclusion criteria, includes

- * locally characteristic landscapes of high visibility
- * landscapes of high sensitivity to a local community
- * landscapes of low visual absorption capacity
- * landscapes locally rare
- * landscapes which are vulnerable or isolated.

Mapping of landscape character areas

Boundaries between landscape areas were located as close as possible to places where the character changes and are intended to include the elements which give each one its character. The boundaries shown for each landscape unit therefore represent the area within which a particular landscape character exists. However, character does not always change abruptly, or occurs over wide areas. In these cases the boundaries were placed at physically or culturally important or popularly recognised places, such as ridge lines, roads etc. These locations are also often at natural boundaries such as catchment boundaries.

9.1.2 Scenic Quality Issues

The second major part of the methodology, was an assessment of scenic conservation issues which relate to each landscape unit, based on the detailed character description and combined with documentary evidence. Three main issues were identified as of importance in conservation of scenic quality.

Visual Absorption Capacity

This is a qualitative estimation of the capacity of the landscape to absorb development without its character being significantly changed or its scenic quality being reduced.

Visual sensitivity

This is a qualitative estimation of the sensitivity of a particular place to changes in its visual character, when taking into consideration the number of viewers who could experience it, the importance of viewing places from which it can be seen, its visibility and its character.

Detracting Elements

Detracting elements, while they form part of the character of a place, reduce the overall scenic quality by excessive contrast with more harmonious elements, by being isolated and conspicuous, locally out of character, or by degrading or obscuring the natural features or cultural elements of the scene. Examples of detracting elements include unsightly and out of character structures and development, ridge top buildings and highly visible construction works.

Derived from these scenic quality and related landscape management issues, a planning strategy can be formulated for each landscape unit, including actions which could be taken to conserve and enhance scenic quality.

9.2 Overall physical and cultural qualities

Elements of the physical landscape are closely related to scenic quality and character. The major physical elements of the environment determine many of the visual features of the landscape. These elements also directly affect cultural changes to the landscape such as transport routes, settlement pattern and landuse. A set of physical and cultural elements of the landscape were identified as useful in describing the qualities of the rural lands (Table 9.1). These elements change in nature as the scale of the area under consideration becomes smaller. The same basic elements were used in this part of the study and also in the later identification of areas of scenic character.

The rural lands occur in part of the Hornsby Plateau land system, an area characterised by underlying Hawkesbury Sandstone geology. The area is roughly wedge shaped, wider at the north and tapering toward a short boundary in the south. The lands have natural boundaries on all sides which relate to the plateau and its division into topographically distinct parts by the erosive action of rivers and streams. The northern and eastern boundaries are formed by the drowned valleys of the Hawkesbury River and its tributary, Berowra Waters. The western boundary is formed by the ridge which marks the watershed between the catchments of Cattai Creek and Berowra Creek. The southern boundary is less distinct.

The plateau surface is rather flat, high points being generally of the order of 200- 230m AHD in elevation. However the plateau surface has been eroded by stream action and the topography increases rapidly in steepness toward the margins and in the northern section, where the river valleys are deeply incised and have precipitous sides.

The plateau surface bears the remnants of the Wianamatta Shale geology which once overlayed the entire area. Most of the shales have eroded in the northern section of the area, exposing the Hawkesbury Sandstone geology of Marramarra National Park with its dissected topography and natural vegetation. Where the shallow remains of the shales and their remnant soils occur, the

landscapes have a gently rolling surface typical of the Dural-Arcadia area. The shale influenced landscapes are extensively cleared and intensively used for a variety of rural, rural industrial, residential and agricultural uses. They contrast to the natural landscapes of the areas with Hawkesbury Sandstone surface geology, where soils are of a lesser quality for agricultural use.

Within the rural landscapes of the plateau top, the underlying Hawkesbury Sandstone continues to have a strong influence on visual qualities. The shale influenced Glenorie soil landscapes, which have the highest agricultural potential, are shallow and tend to be found only on the broad tops of the ridges. They support the most intensive uses, such as market gardens, flower farms and nurseries.

Between these broader ridge crests, erosion tends to expose Hawkesbury Sandstone influenced soils such as the Lucas Heights soil landscapes. These are less productive and tend to support less intensive uses such as orchards, chicken farms, grazing and residential uses. Further down the slopes Gymea soils are frequently found, which are less productive still. The best of these tend to be used for grazing, horse studs and residences and the less fertile for residential use.

Many gullies of the plateau tops contain natural vegetation because of the lower quality soils which are exposed there. The gentle topography means that these remnants are visually quite prominent and have the effect of dividing the area into small visual catchments by restricting the distance over which views can penetrate. These remnants have a very extensive influence on scenic quality and character even though they are quite restricted in extent.

The gentle topography of the plateau top also has the effect that there are few locations from which extensive views are available, other than at the margins of the area. Two exceptions are the Old Northern Road and areas on the plateau margin in the vicinity of Galston. The former runs along the major ridge in the west of the area. Extensive views to the west toward the Blue Mountains over the Hawkesbury River flood plain are available here. From the Galston area there are closer views over the Berowra Creek gorge toward Mount Kuring-gai and Hornsby Heights.

The overall scenic character of the plateau top is of a rural environment within a natural setting. There are few urban or semi-urban areas and these only rural villages, such as Galston. The

natural attributes of the landscape remain as significant elements in the more intensively settled areas and become dominant when moving away from the interior of the area, either to the north or east. The change in character is quite dramatic because of the sharp boundaries which exist between soil landscapes and topographic features.

The overall character of the northern and eastern parts of the area is substantially different and dominated by the natural environment. Marramarra National Park forms the northern section of the area and is bounded on the north by the Hawkesbury Valley and in the east by Berowra Waters. The topography is dissected by steep sided gullies and the drowned valleys of the river and is clothed with natural vegetation consisting mainly of sclerophyll woodlands on the Hawkesbury Sandstone influenced soil landscapes such as Gymea, Lambert and Hawkesbury. Cultural changes are restricted by the steep topography, lower quality soils and difficult access. On the Hawkesbury River alluvial soils of the Lane Cove and Mangrove Creek soil landscape have been put to residential, agricultural and recreational use and the lower quality Watagan soils on the Narrabeen series of sediments on the lower slopes are put to residential use. The river corridors are characterised by linear and expansive landscapes which are restricted laterally by the steep surrounding hills of the plateau.

There is evidence that rural uses are changing in the area and that the character of the area is not stable. The most visually obvious indications are increases in residential use, the decline of rural uses such as horticulture, orcharding and chicken farming and the conversion of areas with these declining uses into hobby farms, rural residences and facilities for horses and other equestrian uses. These changes are visible in the rural use areas and do not appear to have implications for the natural parts of the area other than from possible visual impacts when viewed from the natural areas. These issues are discussed further below.

9.3 The viewer's experience of the area

While the overall quality of the area can be described as above, people experience the visual qualities both from particular locations where they may live and work, and also by movement about the area. The views and the way they can be experienced are important in considering both the scenic character of the area and in developing programs for conserving the character of the area.

These programs need to be responsive both to the general character of the area and to the specific impacts future changes would have on scenic qualities in specific locations.

For the purposes of this study, the main viewing places were identified in the major corridors of the Old Northern Road, Arcadia Road, Galston Road, Bay Road, Canoelands Road and selected other locations in the interior of the plateau. Significant viewing places were also located on tracks and fire trails in Marramarra National Park. The Hawkesbury River Corridor was investigated between Wisemans Ferry and Bar Island, which is located at the entrance to Berowra Creek. Berowra Creek has been previously assessed in the River Settlements Study (Hornsby Shire Council, 1993b). The views were documented by visiting each location and indicating the nature of the scene visible on a map (Figure 9.1).

Similar mapping conventions to those in the River Settlements Study were used. However, some of these were not considered to be relevant to views on land and were employed only in assessing the river corridor. The conventions used are described on the legend to the map. Briefly they are:

View or vista: This indicates a position from which a vista is visible. A vista is a linear view which extends beyond only foreground. It is a contained view which is restricted in lateral extent, by either elements close to the viewer at each side, or topography at a greater distance. It may also be restricted in the middle distance or background by vegetation or topography. The viewers position can be below, level with or above what is viewed.

Expansive view or panorama: This indicates a position from which a view is visible which is not restricted in lateral extent other than by elements at a distance from the viewer. The distance of the view may be restricted in the middle distance or background by topography. The viewers position is either level with or above the level of the view.

Foreground restriction: This indicates a position where the view is restricted in the foreground by elements such as dense vegetation (a dotted line indicates a screened restriction), or by elements preventing any view through, such as buildings or cuttings (a solid line). Where there could be glimpses of the view, no restriction is indicated.

Visual catchment boundary: In the SREP No. 20, Hawkesbury Nepean River study referred to earlier, the visual catchments of the river corridors are indicated and mapped in the atlas. The atlas should be referred to for this information. The visual catchment boundary is approximately equivalent to the enclosure category mapped in the River Settlements and Brooklyn studies. However, in these studies enclosure is an abstract boundary rather than a mapping of the viewshed. The visual catchment boundary is appropriate for the enclosed landscapes of the rivers but is not considered appropriate for the open plateau landscapes and is not mapped there.

9.3.1 Old Northern Road corridor

This is the most heavily used corridor in the area, servicing the Wisemans Ferry, Hawkesbury Valley and Glenorie areas. The corridor has a visual character of its own, independent of the influences of the landscape types through which it runs. However, the visual experiences depend heavily on the character of the surrounding landscapes. The visual experience of the corridor is varied, although consists of three major elements. These are the Dural section, the Maroota Ridge section and the Wisemans Ferry sections. Each differs in its physical and cultural landscape and the visual experiences.

The Dural-Glenorie Section

The Dural Glenorie section can be considered in the context of the general scenic quality and the development ribbon.

General scenic quality: The section runs along the crest of the watershed between the Middle Hawkesbury Valley to the west of the road and the Berowra Waters catchment to the east. Views are extensive to the west from elevated positions, expansive, panoramic and complex. The feature of most is the Blue Mountains Plateau to the west, seen over the rural foreground, intervening Hills district and Hawkesbury Valley. The views are of outstanding scenic quality and great beauty. They are relatively independent of the scenic quality of the viewing places because of the elevated position of views and the extent of the view.

The views to the east contrast in extent and content. They are mostly smaller scale and closer views with mid ground restriction of vegetation and topography, with the viewer level with the view line. The views are of rural scenery, often with natural backgrounds or horizons of

vegetation. The quality of the views is dependent on the location of the viewing place because of the restricted viewing distance and importance of foreground detail. The views are of low to high scenic quality. They vary greatly because of variations in foreground elements.

The development ribbon: This section of the corridor is the most urban of all the corridors, with the exception of the last section of the Old Northern Road at Wisemans Ferry. As a result, the scenic experience also includes a ribbon of development along the road, both commercial and residential. This has the effect of limiting the viewing places by restricting the view lines. It also contains elements which can direct and also conflict with the quality of the visual experience.

The commercial parts of the ribbon have a mixture of rural and commercial qualities. Nurseries are found among golf driving ranges and hotels, industrial sites beside retail outlets. Many developments come so close to the road as to prevent lateral views. Others are set back and below the site line allowing better vision. There are examples of commercial and industrial development well set back and landscaped which enhance the rural nature of the area.

There is excessive complexity of signage in size, colouring and location, given the rural nature of the locale, and much of this appears unnecessary. Other signs appear to unnecessarily duplicate the same information in the same location. Signs are often placed too close to the road margin and have the effect of focusing the viewers attention back on the road rather than allowing lateral expansion to occur. The effect is visually too urban for a rural environment. By contrast, the vernacular style of small hand painted signs typical of rural areas is quite appropriate.

A further influence on the increasing urbanity of the strip is the building of large and bulky houses oriented to the street in a suburban way and with other typically urban elements, such as high brick fences, security gates, paved entrances etc. These have the effect of preventing views to the landscape beyond. The development of such structures and their suburban appearance is not confined to this corridor, but is a feature of many redevelopments in the area.

Public viewing places in this part of the corridor are not uncommon, though they are becoming less frequent to the west. They are becoming rarer resources as development of the strip proceeds. These places should be given status as locations

which are valuable because of the access to views. In addition, consideration should be given to restricting the impact of new developments which could result in the loss of further visual access.

The Maroota Ridge section

This section, from Middle Dural to near Wisemans Ferry is uniform in character and visual access. The surrounding landscapes are largely natural woodlands on hilly topography. Vistas are restricted to glimpses from cleared areas or near scattered settlement sites on the corridor. Views to the west are similar to those from the Dural section. Views east are generally vistas with middle ground restriction caused by topography and vegetation.

Intrusive elements are restricted to insensitively located quarries and earth works near the road. The westerly views in the area are spectacular but difficult to experience in safety as there are few safe road side viewing places.

The Wisemans Ferry section

This is a very short section of the corridor in the immediate vicinity of Wisemans Ferry, as the road descends to the river and views begin to feature the Hawkesbury Valley. Views are spectacular and panoramic in extent, and both west and easterly views are available. However, there are few viewing places and few lookout places which can be used safely and no material which could assist in the interpretation of the views.

9.3.2 Canoelands Road Corridor

This corridor is not a through route and receives only local traffic and recreational uses. It follows an easterly trending ridge system and runs through a narrow band of agricultural landscapes of orchards. It is surrounded by Marramarra National Park. There are isolated elevated viewing places which are on some of the highest vantage points in the area. Views are panoramic in extent to the east, north and south. To the north, views are over the Hawkesbury Valley and extend as far as the Mangrove plateau and Mount White. To the south, high points of the Warringah area and the Sydney CBD can be seen. South easterly views feature Hornsby Heights and Mt Ku-ring-gai. Industrial buildings are the most recognisable features here.

9.3.3 Galston Road corridor (includes Mid-Dural Road)

This corridor, except for the section in the vicinity of Galston Gorge and Mid-Dural Road, has many similarities to others in the plateau interior. Views are mostly short distance because of restrictions caused by gentle topography and vegetation, either remnant native stands in gullies and on road verges or cultural plantings on properties. There are few elevated viewing places or panoramic views.

The viewer's attention is otherwise drawn to features close to the corridor, which is dominated by rural residential and agricultural landscapes, well managed road verges and by the village of Galston itself.

The residential part of Galston Village is largely unobtrusive, set below the general landscape level in an area of underlying sandstone geology. Vegetation in gardens and in remnants among the streets helps to integrate the village into the landscape effectively. The part of the village to the east of Arcadia Road, on what appears to be previous agricultural land, is more visually obvious, although will become softened in time by increasing growth of trees and shrubs.

If the village is to expand, the direction with the least visual impact implications is to the north west generally (toward Sallaway and School Roads) where it would expand into similar landscape and landform to the main part of the existing village.

The shopping strip however lacks cohesion visually, and exhibits a range of conflicting and competing architecture, signage, parking provisions and landscape elements. Other intrusive elements include the electricity substation near Galston Village, the industrial area on Mid Dural road, including the Council Works Depot and the Telecom Depot in Arcadia Road.

The Galston Gorge and Mid-Dural Road sections are through natural landscapes, the first an enclosed series of views in steep forested landscapes and the second a gently sloping traverse of Colah Creek valley on the plateau top. East of Galston village there are restricted south and easterly vistas. In common with other locations which have views in this direction, the Gundah Ridge area and development at Hornsby Heights are prominent. The road then passes through natural landscapes of the Gorge. Gabion

walls retaining road works are discordant elements in the focal views of the Gorge from the only safe viewing place there.

9.3.4 Arcadia Road corridor (between Galston Village and Arcadia Park)

The complex track of Arcadia Road, its narrowness and its many right angle corners has the effect of altering the corridor experience compared to others. There are many subsidiary roads in the area with similar qualities. Extensive parts are screened by roadside vegetation. Views are generally short vistas of residential and agricultural landscapes with middle ground restriction.

Arcadia village retains some of its original character and vernacular charm with small scale buildings of traditional form and materials and limited hard surface treatments. Nearby developments of large contemporary housing with urban street treatment and extensive paving conflict with the rural character and residential scale of the area and Agricultural, residential and commercial buildings can become cluttered and obtrusive when located near the road, such as the group near Arcadia General Store.

9.3.5 Bay Road corridor (between Arcadia Park and Berowra Waters)

The corridor follows Berrilee Ridge down from Arcadia Park, passing through the settlement of Berrilee above Berowra Waters. The ridge is narrow and the corridor is not confined by screening vegetation so there are many vistas and panoramic views covering north east to south east. The views to the north and south are of natural landscapes over narrow agricultural and residential foregrounds. To the east, views are restricted in the background by ridges with the urban areas of Berowra Heights on their upper slopes.

There are many prominent urban elements in these backgrounds, particularly houses and industrial buildings. The most identifiable of these tend to be large and have one or more of the following qualities: light colour or saturated colours of a hue which contrasts to the surroundings; reflective roofs; simple prismatic shapes; extensive associated earth works and no screening vegetation.

9.3.6 Views from within Marramarra National Park

The park contains many viewing places from which areas outside the park are visible. These places are largely in the eastern section of the park and along its northern margin with the Hawkesbury River. The park's topography and vegetation are such that few views from the major portions extend to the surrounding environment and few are strongly impacted upon by development outside the park.

In the eastern section near the plateau margins, well used fire trails, tracks and Crosslands Road have occasional restricted views across Berowra Creek gorge. Views are of similar character, with lateral and foreground restriction by vegetation. Extensive views are rare. The viewer's experience is dominated by natural vegetation and close detail. Where urban elements of the views can be identified, these are the same ones visible from corridors on the plateau top, such as Berowra Heights, Hornsby Heights and Mt Kuring-gai, although seen from closer range. Moving from south to north on this area, views are possible from Crosslands Road, Dusthole Ridge, Waddell Ridge and Coba Ridge.

In the northern margins of the park, distant views over the Hawkesbury Valley can be extensive from locations above Gentlemans Halt and Laughtondale. Access is difficult and the number of potential viewers is likely to be low. The visual elements of the views are described in the review of scenic quality within the SREP No. 20 area (Travers Morgan and Lamb, 1994).

9.3.7 Hawkesbury River corridor

The scenic character of the area is described in detail in the Hawkesbury Nepean River Scenic Quality Study undertaken in the review of SREP20, encompassing two landscape units, the Wisemans Ferry to Spencer, and Spencer to Berowra Creek units. Both units are considered to have state-wide scenic significance and to be of high scenic quality.

The river corridor is unusual in that it can be experienced by travel on land or water. Over most of its length there are roads on both sides from which it can be seen and it can also be approached through national parks which make up most of the surrounding landscape. Viewing locations are virtually unrestricted on the river and views are limited only by midground or distant topography, waterform and bankside

vegetation. Visual experiences are different on land, particularly on Singleton's Road. Vistas and panoramic views are still common, but intervening vegetation, alluvial flats and mangrove forests often obscure views of the river and of buildings and development on the river margins. The location of the road at the foot of precipitous slopes limits southward views and directs attention to the river and beyond. Views from the plateau tops in the national parks are spectacular because of their elevation and the steep terrain, although access is difficult.

There are few detracting elements in the Hornsby rural lands in the corridor. The grandeur of the scenery, low level of development and the rural and residential scale of buildings allows most present development to fit harmoniously into the scene. However in the vicinity of Wisemans Ferry there are several conspicuous houses which are visible from great distances, set high on steep slopes, which conflict with the natural setting provided by the rock faces and cliffs and which appear out of place compared with the waterside location of other development.

At a lower level, near Riverland is a especially conspicuous house with an urban landscape and fencing, prominent from the water and land because of the bulk, simple suburban form, light pinkish colour and flat unrelieved surfaces produced by security shutters over the windows.

9.4 Areas of scenic significance

The landscape classification process revealed that all of the landscapes of the rural lands are in the

same land system, the Hornsby Plateau. The area drains into the Lower Hawkesbury Valley subsystem and is composed of a single dissected plateau unit. The landscape within the plateau is not composed of discrete units but instead shows a range of variations.

There is a relatively simple set of landscape types in the area which are closely related to the physical elements of landform, soil landscape and vegetation and to the cultural elements of land cover, land use and settlement pattern. The landscape types are consistent, in that combinations of their physical and cultural elements are frequently repeated in many discrete locations in the area. It is the repetition of areas of identifiable scenic character within a consistent physical landscape and natural setting which gives the rural lands their overall character and coherence.

The conservation of the scenic quality of the rural lands in the long term depends on the conservation of each of the elements and characters. For this reason, the scenic quality of the various landscape character types is not ranked from the most to the least. This might be taken to suggest that areas of the least quality had no need of programs to conserve or enhance their scenic quality.

Nine landscape character types were identified, a summary of which and their significance is detailed in Table 9.2. The location of the character types is detailed in Figure 9.2.

Table 9.2
Landscape character types

Character type	Significance
Type 1:	Mixed intensive agriculture
Type 2:	Mixed agriculture and rural residential
Type 3:	Orchards and poultry farms
Type 4:	Intensive orchard landscapes
Type 5:	Active conversion of orchard and poultry farms to hobby farms
Type 6:	Rural residential on marginal land
Type 7:	Alluvial agricultural lands
Type 8:	Alluvial wetlands
Type 9:	Creek flood plains

A brief descriptions of each landscape character types is provided below, including an overview of the landscape character, scenic quality issues and level of significance. A full description is provided in Appendix J.

Type 1: Mixed Intensive Agriculture

Type 1 visual character occurs along the ridges between Glenhaven, Glenorie and Galston.

Landscape character: A fully designed and maintained cultural landscape with few intrinsic natural elements, dominated by horticulture and agricultural production on small holdings. Residences and agricultural buildings are prominent and often undisguised by gardens, with productive landscape coming right up to the structures. Houses are often located away from the road frontage and oriented in the traditional rural manner to take advantage of environmental conditions. Wind breaks and avenues of ornamental and exotic trees are occasionally seen between and within properties. Pines are often the most conspicuous species both by their height, crown form and dark colour. Landscapes have great visual variety at a small scale because of the intensive use of small plots of land for varied uses, often with bare soil, differing crops and growth stages present. Colour, line and texture contrasts between lots and between adjoining properties are common and vary with the seasons. Flowers in farms and nurseries frequently add brilliance and further variations as blocks of colour with varied textures.

Scenic quality issues: Residential and hobby farming conversion of the area has the potential to alter the rural character to one which is less identifiable with the area and more urban. It can have the effect of simplifying the visual elements, decreasing the variety of rural activities and making the landscape appear more open by removing the intensive, small scale of plots which is characteristic of the area. Cultural plantings of wind row species such as pines and other conifers are reaching the end of their lives and native vegetation remnants on road verges are vulnerable to loss following regular mowing and grazing.

Significance: Regional significance. These landscapes are confined to the Lower Hawkesbury Valley sub-system and are the only examples in the region of the particular combination of cultural elements and Glenorie soil landscapes.

Type 2 - Mixed Agricultural and Rural Residential

Type 2 visual character occurs extensively between Glenhaven, Glenorie and Berribee.

Landscape character: A rural cultural landscape dominated by larger scale agricultural production and rural industries, hobby farms and rural residences on small holdings. Natural vegetation is an intrinsic element on road verges, creek lines and some hill tops. Agricultural buildings such as packing sheds and demountable greenhouses are prominent. Residences are often surrounded by gardens and properties by post and rail fences. Houses are often located away from the road frontage and oriented in the traditional rural manner to take advantage of environmental conditions. Wind breaks and avenues of ornamental and exotic trees are common. Landscapes have visual variety resulting from the mix of land uses rather than small scale contrasts among adjoining similar uses. Grazed and manicured grassy areas, horses and stables are common. Large residences with designed and managed formal gardens and surrounding landscapes, often set well back from the road, are found within productive agricultural land.

Scenic quality issues: Residential and hobby farming conversion of the area appears to be having the effect of replacing variety of land uses with uniformity, either of grazing land with horses or residential with manicured grassy surroundings. The rural character and diversity is under threat from a more uniform and more urban character. Cultural plantings of wind row species such as pines and other conifers are reaching the end of their lives and native vegetation remnants on road verges are vulnerable to loss following regular mowing and grazing.

Significance: Local significance. These landscapes are representative of the Hornsby area and appreciated by the local community.

Type 3: Orchards and Poultry Farming

Type 3 visual character occurs to the southwest of Galston, Fiddletown and at a number of locations along Old Northern Road, north of Glenorie.

Landscape character: A landscape dominated by agricultural production of fruit and chickens. Natural vegetation is an intrinsic element on road verges, creek lines and some hill tops. Agricultural buildings such as packing sheds and

chicken sheds are prominent. Houses are often located away from the road frontage, related to farm buildings and without formal gardens. Wind breaks of exotic trees are common, particularly of pines. Landscapes have less visual variety than other mixed agricultural areas.

Scenic quality issues: The apparent decline of both rural industries in the area has the potential to change the rural character. Similar areas are already converted either to grazing land with horses or residential with manicured grassy surroundings. The rural character could be replaced with a more uniform and more urban character. Wind rows and other cultural plantings are vulnerable to loss in this process.

Significance: Local significance. These landscapes contribute to the rural quality of the area and are becoming rare.

Type 4: Intensive Orchard Landscapes

Type 4 visual character occurs at Canoelands and at two locations adjacent to the Old Northern Road, north of Glenorie.

Landscape character: A rural cultural landscape dominated by orchards and rural residences on small holdings in a natural setting. Natural vegetation is the major intrinsic element of the larger view. Landscapes have visual interest from the geometry, line, texture and colour contrasts which occur between the orchards and the natural surroundings, although little variety.

Scenic quality issues: These areas are in the process of active change in their character, while remaining within the rural genre. Intensive reuse of these areas for orchards ensures a stable visual character for them at present.

Significance: Local significance. These landscapes are outstanding local examples of a type which is not common in the Hornsby Area.

Type 5: Active conversion of Orchard and Poultry Farms to Hobby Farms

Type 5 visual character occurs in six locations at Arcadia, Fiddletown, Berribee and Glenorie.

Landscape character: A rural cultural landscape dominated by hobby farms and rural residences on small holdings. Natural vegetation is an intrinsic element on road verges, creek lines and some hill tops. New residences are often

surrounded by gardens and properties by post and rail fences. Wind breaks and avenues previously associated with orchards are common. Landscapes have less visual variety as they are converted from agricultural use. Grazed and manicured grassy areas, horses and stables are common among remnants of the previous land use.

Scenic quality issues: Residential and hobby farming conversion of the area has the effect of replacing variety with uniformity, and diversity of land cover with the openness and simplicity of grazed paddocks or residences with manicured grassy surroundings. Cultural plantings and native vegetation remnants are vulnerable to loss following clearing, filling, recontouring, regular mowing and grazing.

Significance: Local significance. These areas are characteristic of the Hornsby area, have low visual absorption capacity and high sensitivity.

Type 6: Rural Residential on Marginal Land

Type 6 visual character occurs throughout the study area incorporating rural areas adjacent to bushland.

Landscape character: A secluded residential landscape in a bush setting with a generally harmonious relationship between residences and the natural landscape. Natural vegetation is an intrinsic element among which residences and designed landscapes are found. Residences are often surrounded by gardens and located away from the road frontage. Ornamental and exotic plantings are common but tend to be subordinate to the native bush setting. Landscapes have visual variety resulting from the mix of residential and garden styles.

Scenic quality issues: These areas often have little visual impact on the surrounding rural landscapes because they are hidden by topography and vegetation. Their expansion into areas of the plateau which have more rural character would be undesirable.

Significance: Local significance. These areas add to the variety of visual elements in the area.

Type 7: Alluvial Agricultural Lands

Type 7 visual character occurs on the wide floodplains of the Hawkesbury River between Wisemans Ferry and Laughtondale.

Landscape character: A rural cultural landscape dominated by the spectacular natural environment into which the cultural elements fit harmoniously although are subordinate. Residences and farm building vary in prominence depending on being viewed from road or water. Houses are often located away from the road frontage and oriented in the traditional rural manner to take advantage of views and breezes. Landscapes of the flats have little visual variety of topography, vegetation or land use.

Scenic quality issues: Residences and recreational facilities are highly visible from the waterway and in some cases Singleton Road. The rural character of the area could easily be affected by even relatively modest development such as low density residential subdivision or recreational resorts.

Significance: State significance. These landscapes are part of a landscape of acknowledged high scenic value and are also rare in the local area.

Type 8: Alluvial Wetlands

Type 8 visual character occurs along the Hawkesbury River associated with extensive mangrove stands, such as those on Courangra Point.

Landscape character: A natural river landscape dominated by mixed wetland vegetation.

Scenic quality issues: Maintenance of natural processes and prevention of exploitation of these landscapes is all that is required to retain their character.

Significance: State significance. These landscapes are part of a landscape of acknowledged high scenic value and are also rare in the Hornsby area and threatened by decreasing water quality standards.

Type 9: Creek Flood Plains

Type 9 visual character occurs within enclosed valleys of Laybury and Ashdale Creek and Dalgety's Creek, tributaries of the Hawkesbury River.

Landscape character: Small and secluded wetland landscapes which are away from the river and roads as visual access, surrounded by precipitous sandstone hills and cliffs with natural vegetation.

Scenic quality issues: The wetlands are vulnerable to degradation caused by clearing and grazing.

Significance: State significance. These landscapes are rare in the Hornsby area and threatened by decreasing water quality standards.

Each of the above character types warrants individual responses in the preparation of controls to protect the visual environment of the study area.

9.5 Visual Environment Conclusions

The rural lands of Hornsby Shire have a range of visual qualities and characteristics ranging from among the most spectacular in the state to more modest. The landscapes of this area are changing under the influence of natural processes, land use and pressure for settlement pattern changes.

Among the landscapes of the area are some already recognized as of State wide, or regional scenic significance in draft amendments to Sydney Regional Environmental Plan No. 20, Hawkesbury Nepean River. Recent community involvement has also indicated that the scenic qualities, natural environment and rural atmosphere of the area are other valued attributes.

Changes to the land use and settlement pattern of the rural lands have the potential to alter the visual quality of the area in the future. To conserve the desirable values of the rural lands it is necessary to identify the qualities which give the area its scenic and rural character.

Derived from these scenic quality and related landscape management issues, a planning strategy can be formulated for each landscape unit, including actions which could be taken to conserve and enhance scenic quality.

There is a relatively simple set of landscape types in the area which are closely related to the physical elements of landform, soil landscape and vegetation and to the cultural elements of land cover, land use and settlement pattern. The landscape types are consistent, in that combinations of their physical and cultural elements are frequently repeated in many discrete locations in the area. It is the repetition of areas of identifiable scenic character within a consistent physical landscape and natural setting which gives the rural lands their overall character and coherence.

The conservation of the scenic quality of the rural lands in the long term depends on the conservation of each of the elements and characters. The Planning Strategy should provide a means to conserve the visual qualities of the area and establish controls to protect and enhance the visual environment.

CHAPTER TEN - COMMUNITY ISSUES AND SERVICES

The provision of community facilities and services contributes to the quality of life for individuals and the wider community. This part of the Study will address the principal social needs of the community having regard to the existing community profile, social support facilities, community preferences and the provision of additional facilities. It is to be noted that only primary needs are considered. The population of the region is reliant on services provided in both the Hornsby and Baulkham Hills Local Government areas. Consequently, it is necessary to consider the population of both areas and the facilities provided in each, to enable community needs to be determined.

The residents' survey conducted as part of this study also provides information to gauge resident preferences and is used in this section to assist in establishing needs.

10.1 Community profile

In evaluating community issues and services it is necessary to consider the demographic, social and

economic characteristics of the community. The community profile will enable the identification of existing and future community needs and identify target groups.

10.1.1 Population profile

The population of the study area at the 1991 Census was 9,290 persons, however there are an additional 6,423 persons in the adjoining locality within Baulkham Hills, Hawkesbury and Gosford Council areas, creating a regional population of 15,713 persons (ABS, 1993). The population breakdown between villages and localities within the study area and adjoining land is detailed in Table 10.1.

The population within the study area (Hornsby Shire) has gradually increased since 1971 (Figure 10.1). Between 1976 and 1981 the population increased by 28% (2,309 persons) which coincides with the subdivision of Glenorie and Galston into residential sized allotments and the resulting residential population. Since 1981, the population has continued to increase although the percentage increase declined to 4.5% between 1986 and 1991.

Table 10.1
Population distribution

Locality	Hornsby	Baulkham Hills	Hawkesbury	Gosford	Total
South Dural/Glenhaven	527	708	-	-	1235
Round Corner	-	894	-	-	894
Dural	1936	773	-	-	2709
Galston - village	1203	-	-	-	1203
Galston - rural	1708	-	-	-	1708
Middle Dural	-	1001	-	-	1001
Arcadia/Berrilee	1971	-	-	-	1971
Glenorie - village	477	317	-	-	794
Glenorie - rural	666	668	-	-	1334
Canoelands	498	627	-	-	1125
Wisemans Ferry/Maroota	304	548	750	137	1739
Total	9,290	5536	750	137	15,713

(Source: ABS, 1994)

Notes: * Figures are based on collector district boundaries which do not coincide with locality boundaries.

* Arcadia/Berrilee also includes the populations with the River Settlements on the western side of Berowra Creek which was estimated at 330 in 1993 (Hornsby Shire Council, 1993b).

Table 10.1 indicates that a greater population is located in the southern part of the study area, at Dural, Galston and Arcadia, which reflects the occurrence of residential areas and smaller sized rural allotments. The population within the northern half of the study area is less concentrated and exists within discrete locations, separated by Marramarra National Park and other Crown bushland.

A comparison of the age distribution of the study area with that of the total region reveals only minor differences. Consequently, the consideration of the needs of the total region will also reflect those of the study area within Hornsby Shire.

A profile of the population is best illustrated by comparing the age distribution of the region and the Sydney Statistical Division as depicted in Figure 10.2, below.

Figure 10.2 illustrates that the age distribution of the study area and the Sydney Statistical Division are similar. The largest variation between the two populations is the 15 to 19 year age group for the study region being 2.5% higher than the Sydney average. The study area has a higher than average proportion of the population in the 5 to 19 and 40 to 59 age groups and a lower average proportion in the 20 to 39 and above 65 age groups.

The population of the study area can best be described as a "mature" population, as there is an about average percentage of 15 to 19 year olds and 30 to 49 year olds. Mature populations indicate a fairly static population, comprising a majority of established families (parents with teenagers) and some households of young working adults.

Figure 10.1
Population growth

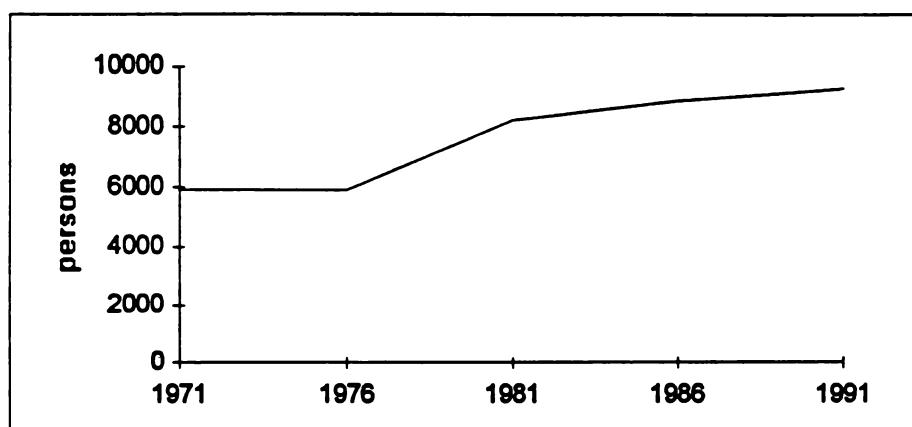
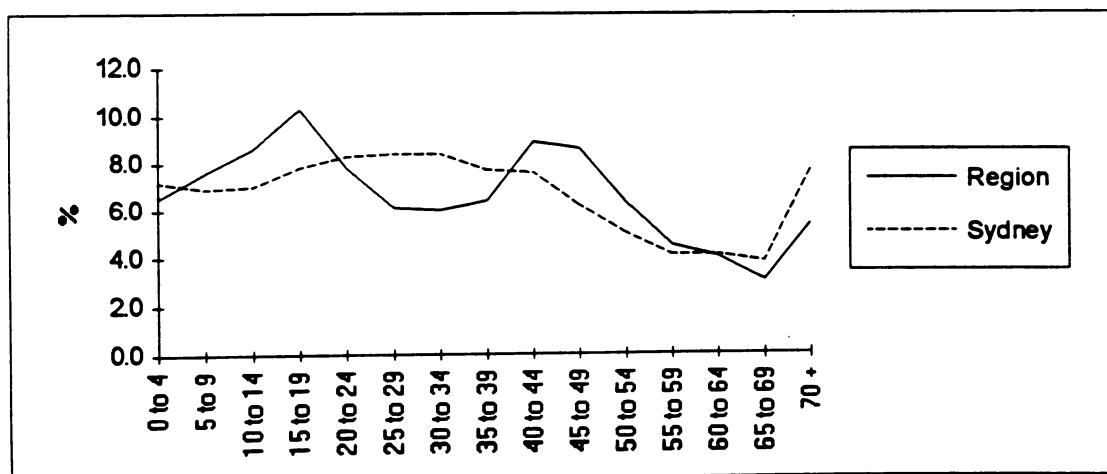


Figure 10.2
Age Distribution



The similar age distribution indicates that the needs of the local population will be similar to those of the Sydney Statistical Division. Consequently, the current provision of children's health care services (0 to 5 years), youth support services (12 to 19 years) and aged persons (above 65 years) should reflect the average demand for services throughout Sydney.

A comparison of the changes in age structure of the study area for the previous two intercensal periods, for 1981 and 1986, provides an indication of how the population is changing and consequently how needs for community facilities may change. Figure 10.3 indicates that the age structure has remained relatively stable (variation within 3%), although there are declines in the 0 to 14 and 25 to 39 and 50 to 59 age groups and increases in the 35 to 49 and 65+ age groups.

The decrease in the 0 to 14 age groups indicates that there is a decreasing demand for facilities for children, while the demand for facilities for teenagers (15 to 19) has remained constant. Over the planning horizon of 20 years it can be anticipated that the proportion in the older age groups will increase as the lower age groups are not supplemented by younger families with children. The ageing of the population is already evident in the 65 and over age group, which represented 5.5% of the population in 1981 and 8.0% in 1991. The increasing number of people in the above older age groups, indicates that there will be an increasing demand for medical, aged care and service facilities.

10.1.2 Length of residence

As part of the residents' survey, a question asked how long had people lived in the area. The responses to this question provide an indication of when people moved into the area and the attractiveness of the area as a place to live. Figure 10.4 summarised the responses and indicates that 50.8% of respondents have lived in the study area for 10 to 29 years, 20% for 5 to 9 years and 14.2% for more than 30 years. The responses for the individual localities also reflects this pattern. The responses indicate that the majority of people have lived in the area for more than 10 years, suggesting that the people move to the area for long periods and that the area is attractive.

10.1.3 Cultural background

The consideration of the cultural background of the area is necessary to determine if there are specific needs, such as ethnic community groups or English language classes. Data from the 1991 Census indicated that 77.3% of the study area population was born in Australia, 11% in English speaking countries and 11% in non-English speaking countries. Of the overseas born, 6.2% were born in the United Kingdom, 3.1% in Italy, 1.7% in New Zealand and 1.1% in Lebanon. Consequently, there appears to be little demand for specific community services to target ethnic groups. Similarly, only 11% of the population is from non-English speaking background, so there is a low demand for English language classes or the publication of information in other languages.

Figure 10.3
Age structure comparison - Study Area

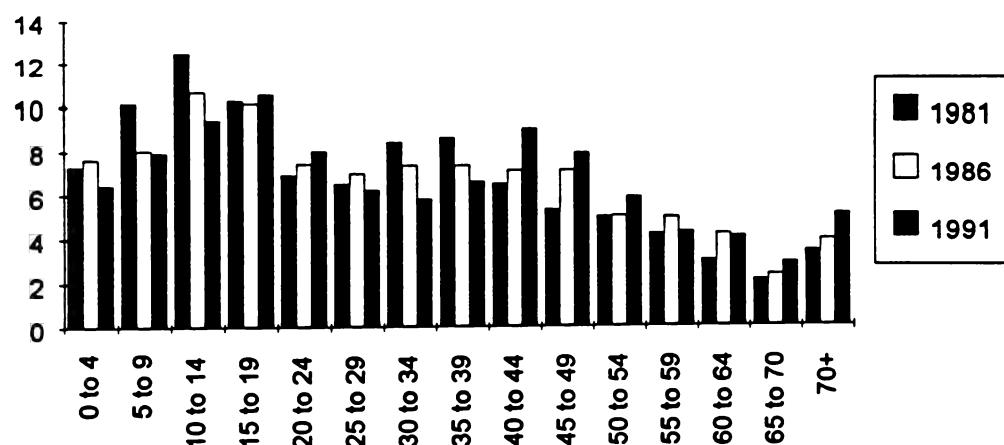
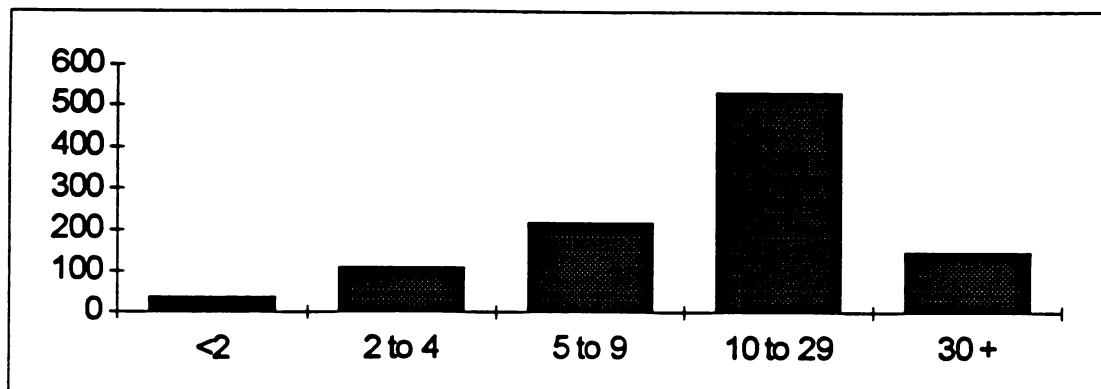


Figure 10.4
Length of time lived in area



10.1.4 Living arrangements

As part of the 1991 Census, a family was defined as a group of related individuals where at least one person is aged 15 years or over. The term related includes related by birth and by the formation of a marriage or defacto relationship. Up to three families may be counted in one household: the primary family and up to two others. This is important, as it permits identification of extended families. For the 1991 Census, a household consisted of:

- One person living alone;
- A primary family unit, with or without non-family members;
- A primary family, with up to two other family units;
- Two or more unrelated people (ie, a group household); and
- Only visitors.

Each of these categories can represent different stages in an individual's life. The current practice generally is for young adults to leave the parental home, to live in independent accommodation. They may subsequently develop relationships and marry, or live in defacto relationships. The primary family changes where child bearing and child rearing occurs. When the child grows to maturity and leaves home, the primary family again changes.

Changes in education time spans and an increasing trend of higher youth unemployment means that young adults are remaining in the family unit for longer periods (ie, non-dependent adolescents over the age of 15 years). These figures can also include grandparents living with the primary family as an extended family. The death, divorce or separation of a spouse can result

in the formation of lone person households and single parent families.

Factors that can affect the primary family include:

- Increased life expectancy;
- Declining fertility;
- Marrying later in life;
- Patterns of divorce and remarriage;
- Defacto relationships;
- Working wives/mothers; and
- Changing social norms.

The main implications of these changes include an increase in non-family households; a declining emphasis on traditional families and couples with dependent children and an increase in the role of single parent families, which influence the provision of community facilities. These changes are expected to continue as economic and social values and changes impact on the family unit.

In terms of household type, the study area consists of 83.7% of one family households, 11% one person household, and less than 3% of group and multiple family households. Of the one family households, 64% are two parent families, 24% couples without offspring and 9.5% one parent families. These figures are similar to those for Hornsby Shire although different for the Sydney region, for example the Sydney region has a lower proportion of two parent households (54%).

These living arrangements are confirmed by the occupancy ratio of the study area. The study area has an occupancy rate of 3.4 persons per dwelling, which is slightly higher than the average for Hornsby Shire (3.1) and the Sydney region (2.7).

The two sets of figures indicate that children in the study area tend to live at home with their parents longer than the case in other areas. This could be a result of the desire of youth to remain at home longer or alternatively a reflection of the lack of appropriate and affordable housing for this age group. Less than 10% of the households are one parent families, indicating that there is some demand from this group for access to child care services and support programmes.

In terms of household accommodation, 94% of the household live in separate houses, rather than caravans, flats and duplexes. This figure reflects the zoning and subdivision standards of the area, which encourages the erection of one dwelling per property in both rural and residential areas.

10.1.5 Education and occupation

The level of education attainment and occupation of the population provides a further indication of the characteristics of the population. The occupation of parents and ethnic background can indicate the employment opportunities available and can influence parents' expectations for their children.

Economic circumstances can also effect the level of educational attainment within the community. The recent recession and the associated decline in job vacancies, for example, has seen increasing numbers of people opting to pursue further studies with a subsequent increase of student enrolments in learning institutions. In addition, large numbers of people have been undertaking vocational and basic vocational training courses to prepare for an improvement in the job market as economic circumstances improve.

Educational qualifications recorded for the 1991 Census measure the highest level achieved by a person since leaving school. Of persons aged over 15 years within the study area, 52.8% of persons are not qualified, 12% are vocationally skilled, 7.1% have a bachelor degree and 5.6% an undergraduate diploma.

The level of attainment for the rural areas is significantly lower than that recorded for the Hornsby Shire, where over 51% of the population held a tertiary qualification. Of these, 21.6% were university qualifications and 10% were trade qualifications. The lower proportion of higher qualifications reflects different educational background and employment based educational needs of the residents in the rural areas.

In terms of occupation, there were 4,764 persons in the labour force (ie, aged 15 years or more), of which 94.8% were employed and 5.1% unemployed. The unemployment rate is similar to that for Hornsby Shire (5.5%) although is lower than the unemployment rate for the Sydney region (10.3%). However, the labour force participation rate of 4,764 persons represents 51% of the population and is 14% lower than the Hornsby Shire average (65%).

In terms of occupation, 21% of the employed persons are managers or administrators, 14.5% clerks, 14.1% professionals, 13.3% tradespersons and 11.7% sales and personal service workers. The level of managers and tradespersons is higher in the rural areas than the urban areas of the Shire. Conversely, the level of professionals is higher in the urban areas of the Shire, reflecting the different levels of education qualifications. The high proportion of managers and administrators in the area is likely to include those persons who have trade or agricultural backgrounds and now manage agricultural properties or businesses within the rural area.

A further indicator of education and occupation is income levels. Income levels also provide useful information on the need for community services, such as social welfare.

The 1991 Census indicates that the average annual household income for the study area is \$52,400, which compares favourably with the Hornsby Shire average of \$51,850 and the Sydney region of \$42,000. Of the 2,686 households recorded in the study area, 18.7% had an annual household income of between \$40,001 and \$60,000, while 14% of the households had an income of less than \$20,000 and 9.8% of the households had an income greater than \$100,000.

A comparison with the annual household income for the Sydney region indicates that the rural areas comprise a lower percentage of households with an income of less than \$40,000 and a higher percentage of households with incomes above \$50,000. The income figures suggest that the need for community services for low income households is lower in the study area than the Sydney average.

In summary, an examination of the demographic, social and economic characteristics of the population within the study area suggests that the group currently most in need of services are teenagers and young adults, however, in the

future, the demand for services for the aged will increase.

10.2 Community Services

The baseline community services to be considered include child care centres, youth facilities, community halls/centres, library facilities, school facilities, emergency services and senior citizens facilities. Figure 10.5 shows the location of existing community facilities.

10.2.1. Child Care

There are three Early Childhood Centres (formerly known as Baby Health Centres) within the study region, located at the Galston Health and Resources Centre, Wisemans Ferry Community Health Centre and at the Old School Teacher's Residence at South Maroota. The Centres are run by the Hornsby Hospital Area Health Service in buildings usually provided by the local Council. Nurses at the Centres supervise the health and development of babies, organise mothers groups and parenthood classes.

Attendance figures for the Galston Centre for 1993/94 indicate that 2,139 children attended the early childhood health service 3 days per week, 760 vaccinations were provided to children, 836 children attended vacation care run over 8 weeks, and 3,000 children attended playgroup 3 days per week. The Galston Centre services the majority of the rural area between Dural and Forest Glen. The Early Childhood Centres at Wisemans Ferry

and South Maroota are serviced by the Galston Centre 1 day per week.

An indication of the demand for the services is provided by a comparison of the 1992/93 and 1993/94 attendance at the early childhood health service. In 1992/93 the early childhood service operated 5 days per week and was attended by over 3,000 children at an average of 11.5 children per day. In 1993/94 the service was decreased to 3 days per week and was attended by 2,139 children at an average of 13.7 children per day. The comparison indicates that the decrease in opening times has resulted in the clinic being busier when open.

As evidenced by the Galston Health and Resource Centre, these Early Childhood Centres provide a variety of services to children and their parents. Given the existing relatively constant birth rate, it is anticipated that the demand for these services will continue.

The region contains a total of 11 pre-schools, kindergartens, long day care centres and occasional care centres, which provide places for over 340 children, as summarised in Table 10.2. It should be noted that the different type of centres provide different types of child care service, with variations in days and times of operation and short or long term child care.

The Table does not include children looked after by 'home carers', where less than six children are cared for by an adult in a home.

Table 10.2
Child care services

Name/location	Age group	No. of children
Dural Memorial Pre-school kindergarten	2.5 - 5	40
Dural Private Pre-school	2.5 - 5	40
Ellerman Park Long Day Care Centre - Dural	0 - 5	40
Glenhaven Occasional Care Centre	2 - 5	15
Wagtail Long Day Care Centre	2 - 5	30
Glenhope Kindergarten - Glenhaven	2 - 5	36
Galston District Pre-school	3 - 5	25
Galston Long Day Care Centre	0 - 5	40
Glenorie Pre-school unit 1	3 - 5	25
Glenorie Pre-school unit 2	3	20
Gumnut Cottage Long Day Care Centre - Kenthurst	0 - 5	30
Forgotten Valley Mobile Resource Unit		
Total		341

As indicated previously, there are 589 children in the study area and 1,020 children in the region less than five years of age. The number of places available is 33% of the number of children that could utilise this service. This ratio of one place for every three children is high when compared with Department of Community Service standard for long day care centres of one place for 10 children in the 3 - 6 age group. The age structure comparison (Figure 10.3) indicates that the number of children born over the last three Census periods has decreased slightly (1%), accordingly the demand for child care places may also decrease. However, demand could increase if planning controls are varied to allow more housing.

10.2.2. Before and After School Care

Before and After School Care is provided for primary school aged children (5 - 11 years old) at primary schools or locations close to primary schools before and after school hours. This service is only provided at one location in the region, namely the Glenhaven After School Care Centre, which caters for 25 students. Given a study area population of 1,022 and region population of 1,671 children in this age group, there would appear to be demand for the increased provision of this service.

10.2.3. Youth Facilities

Teenagers (10 to 19 year old) make up the largest proportion of the population (19.9%) which is 5.1% above the Sydney average.

The above average proportion of teenagers indicates a current high demand for facilities to service this age group. Over 67% of respondents to the residents survey indicated that youth

facilities were inadequate, especially for high school children in the 13-15 age group.

However, the study area has a limited variety of cultural, educational and sporting facilities available for the youth of the community. These are represented in traditional activities such as scouts and guides, as well as those associated with sporting and church groups in the area. The mobility of teenagers within the study area is limited by the poor provision of public transport, especially in the evenings.

Consideration should be given to proposals that may support teenagers' nocturnal and diurnal social needs such as coffee shops/cafes, low cost restaurants, youth drop in centres and active recreation facilities. It is anticipated that the proportion of the population that are teenagers within the study area will decrease in the next 15 years to be similar to the Sydney average, indicating a decreasing need for the services in the future.

10.2.4 Community Halls/Centres

The region contains nine community centres and halls, as summarised in Table 10.3. The community centres are distributed throughout the study area, with each of the major localities served by its own centre. The schools and churchs of the area also provide halls which can be used for community meetings.

All of the Centres are local or district sized facilities. The closest regional sized community centre is located at the Cherrybrook Community Centre which has a capacity for 540 seated persons, 400 in the large hall and 140 in the small hall.

**Table 10.3
Community Centres and Halls**

Centre/ location	Hall capacity (seated)	Meeting Room Capacity (seated)	Persons Per Seat
Arcadia Community Centre	100	12	17.6
Galston Community Centre	110	15	23.3
Glenorie Community Centre	150	-	21.6
Wisemans Ferry Community Centre	70	30	17.4
St Judes Church Hall			
Dural Soldiers Memorial Hall			
Glenhaven Community Centre (existing)	40	20	20
Glenhaven Community Centre (proposed)	350	-	3.5
Maroota South Community Centre			

Each community, with the exception of Canoelands and Middle Dural is served by a community centre and/or hall. However, a comparison of the population with the seated capacity indicates differences in the level of service available. The figures range from 3.5 persons per seat for the proposed Glenhaven Community Centre, which will serve a wider community, to 23.3 persons per seat for the Galston Community Centre. The ratio for Glenorie also includes the population of Canoelands. Without this additional population (1,125 persons) the ratio would decline to 14.3 persons per seat.

Based on population numbers, it would appear that there is demand for additional community halls and meeting rooms at Galston. Hornsby Council has proposed to build a new regional sized community centre (500 seated capacity) at Galston at a cost of \$1.6 million, although the location has not been determined. The new centre would provide halls and meeting rooms to service the wider community. Based on population figures for Galston alone, there appears to be a need for additional community meeting facilities.

There has been community debate as to whether the existing heritage listed community hall should be extended or a new facility built. In terms of location, it would be appropriate for the facility to be located in close proximity to Galston Village and existing community facilities, rather than isolated from the community. As highlighted previously, mobility for children, teenagers and the aged is limited because of the poor provision of public transport in the area. The construction of a community centre away from existing facilities would limit its availability to these groups. Discussions with the Galston Hall Committee during the course of this study indicate a preference for the sympathetic extension to the existing hall with the remainder of the allocated budget being used for other community facilities in Galston. One suggestion is the construction of a gymnasium at Galston Pool.

Hornsby Council has also received a request from residents of Canoelands for the construction of a community hall. As indicated, Canoelands area has a population of 1,125 persons who are isolated from the surrounding rural areas by Marramarra National Park. Residents currently rely on facilities provided at Glenorie (10km south), Maroota (6km north) or Wisemans Ferry (15km north). Although the population of

Canoelands is limited, the isolation of the area creates a need for the provision of a small community hall. The possible provision of a community hall should be further investigated in terms of construction and maintenance costs, site location and usage.

10.2.5 Library Services

The region is served by library facilities provided by both Hornsby and Baulkham Hills Councils. Galston Library was opened in a rented shop in Galston Village Shopping Centre in 1973 and moved to its present location in the former Anglican Church opposite the Shopping Centre in 1986. The Library has a floor space of 67.5m² and houses some 11,600 items including adult and junior loan collections (fiction, including large print, paperback and picture-books and non-fiction) and a small reference collection. The library is open to the public 20.5 hours per week.

There is a twice weekly delivery service to Galston Branch on Mondays and Thursdays from other libraries in the Shire. The Library has computer access to the complete collection, enabling users to locate and request any items in the loan collection, to be delivered to Galston Branch. The larger reference collection at the Central Library can be accessed in this way. Loan collections not able to be housed at Galston Branch are available to users through the delivery service, eg, magazines, cassettes, compact discs, videos and literacy materials.

Hornsby Council also provides a Home Library Service to residents who are unable to visit the library owing to ill-health or incapacity. The Service is provided to residents in private homes, retirement villages and nursing homes. The Home Library Service at present visits clients in Glenorie and Glenhaven.

In July 1995 the Hornsby Central Library relocated to larger premises, located close to the shopping facilities and bus/rail interchange in Hornsby. An objective in Hornsby Council's Management Plan for 1996/97 is the opening of a relocated, larger Pennant Hills Branch with extended hours. As Pennant Hills has a bus/rail interchange serving many residents from the north-west of the Shire, it is expected that the new Pennant Hills Branch would be popular with these residents. It is proposed in the Management Plan 1997/98 that the impact of an upgraded Pennant Hills Branch Library on usage at Galston Branch be measured.

Residents of the rural areas of the Shire are also able to use any other public libraries in the State under the Reciprocal Borrowing Scheme. The Reciprocal Borrowing Agreement was formulated in the 1960's and is intended to allow people to borrow from a public library service outside their area. There are two branch libraries within Baulkham Hills Council which residents of Hornsby Shire can join under the Reciprocal Borrowing Agreement, namely the Dural Branch Library (163m² floorspace), located at Round Corner (163m² floorspace) and Castle Hill Branch Library (400m² floorspace) at the Castle Hill Shopping Centre.

Baulkham Hills Shire Council has resolved to build a larger Castle Hill Branch Library in the Castle Towers Complex Stage II in the next two years. The Branch, instead of the existing 400m², will be an optimum 1,360m². The size and shopping facilities of Castle Towers is an attraction to residents throughout the region and it is likely that the library facilities will be utilised by residents from Hornsby Shire as well as other Local Government areas.

Library services are recommended to be available at a rate of 1m² floor space for every 40 people. Consequently, in the region there is demand for 400m² of library floor space, of which 230m² can be attributed to the population of the study area within Hornsby Shire. The floor space available at the Galston and Round Corner Libraries totals 230.5m², which is 169.5m² less than required in the region. Small sized libraries are constrained by limited books available for immediate loan and poor provision of quiet reading areas and meeting rooms. However, the Galston and Castle Hill Libraries are part of a network of libraries within Hornsby and Baulkham Hills Council areas from which additional resources are available, which allows greater service to be provided, despite the limited floor space.

The relocation of Hornsby, Pennant Hills and Castle Hill Libraries to larger premises will increase the library service available.

10.2.6 School Facilities

Over 1,671 primary school age and 1,571 high school age students live in the region. These students are serviced by 10 primary schools providing education for 1,787 students. The schools are located at Galston (300 students), Arcadia (110 students), Berribee (29 students), Middle Dural (70 students), and Glenorie (307 students) within Hornsby Shire and Dural (320 students), Glenhaven (270 students), Kenthurst

(256 students), Maroota (72 students) and Wisemans Ferry (53 students) within Baulkham Hills Shire.

A comparison of the number of primary school age students and 1995 attendance indicates that overall there are adequate school places for the population. The primary schools are located throughout the region, providing access to students in each of the localities. The greatest distance between primary schools is between Glenorie and Maroota, resulting in students from Forest Glen and Canoelands being required to travel to one or the other.

The size of the schools generally reflects the educational demand of the area. The demand for schools in the more populated locations of Dural, Galston and Glenorie is evidenced by the school attendance. In these locations, the number of class rooms and teachers would limit the number of students able to attend.

Given the relatively constant number of 0 to 4 year old children in the region over the last 15 years, the demand for primary school education should remain constant, unless planning controls are varied.

Galston High School is the only public high school in the region, currently educating 1,000 students. Some high school aged students would also attend the nearby Cherrybrook High School (1,200 students), Castle Hill High School and Pennant Hills High School). A number of private high schools have established in the region including, Pacific Hills and Redfield at Dural, Hills Grammar and Oakhill College at Glenhaven and Northholm Grammar at Fiddletown. These Schools provide education to students who live throughout the metropolitan area.

As the population density of the region is greatest in the southern portion, the location of a high school in Galston is appropriate. Although the existing High School is isolated from the majority of other community and retail facilities in Galston, the School is located opposite Galston Recreation Reserve which contains an oval and swimming pool.

As Galston High School caters for 66% of the high school aged population of the region, the remaining 33% of students are required to attend public high schools outside the region or private high schools. Advice from the Department of Education indicates that Cherrybrook, Castle Hill and Pennant Hills High Schools are operating at

capacity and are unable to cater for additional students from the rural area.

Given the decreasing number of children in the 5 - 11 age group over the last 15 years, who will age to attend high school, it is likely that demand for additional places will decrease. Consequently, the provision of additional education facilities at Galston High School should be of a temporary nature to satisfy the current demand. If the current planning and housing controls are varied, an increased population will require additional high school vacancies.

10.2.7 Emergency Services

The region is serviced by Police, Ambulance and Fire Brigade services located at Castle Hill. A Police Station is also located at Wisemans Ferry. In April 1995, the Galston Community Policing Centre was opened in a shop at Galston Village. The Centre is manned by one police officer for 38 hours per week.

In terms of volunteer services, Hornsby Shire Council manages bush fire brigades located at Cherrybrook Dural, Galston, Arcadia, Canoelands and Wisemans Ferry, while Baulkham Hills Shire Council manages the brigades of Glenorie, Middle Dural, Glenhaven, Kenthurst and Maroota. As well as attending to bush fires, the brigades also attend vehicle accidents, search and rescue, storm damage, and house or building fires. The Galston and Arcadia brigades are equipped with breathing apparatus, allowing trained personnel to enter burning structures, when safe. The State Emergency Service covering this area is based at Hornsby.

As the Police, Fire Brigade and Ambulance services have to travel from outside the area, the length of time taken to react in an emergency is often a source of concern for residents. However, the size of the study area and the low population means it is difficult to justify the establishment of these emergency services within the region. The opening of the Police Station at Galston will provide better access for residents to this service.

The community based bush fire brigades are located throughout the study area and provide a local emergency service and personnel are often required to attend a range of emergencies, not just bush fires. The use of breathing apparatus for the village brigades of Arcadia and Galston will enable the organisation to more effectively deal with house/building fires.

10.2.8 Aged and frail services

Limited facilities for the aged are available in the study area. There are two Senior Citizens Clubs within the region, namely the Dural and District Senior Citizens Club and the Wisemans Ferry Senior Citizens Club. The various Community Centres within the region provide meeting rooms and facilities which can be used by the senior citizens of the region.

The Galston Community Health and Resource Centre also provides a variety of health and community services to the aged, including 3204 "meals on wheels" per year, frail aged group one day per week attended by 1300 persons, health clinics and a community bus. The Centre has advised that the average age in the frail aged group is 85 years and that the biggest problems for the elderly are isolation and poor mobility. The Galston Centre provides services to residents between Dural and Forest Glen. As previously noted, the Hornsby District library also provides a home library service to aged residents.

The Rowland Retirement Village at Galston is the only retirement village located within the study area, although a number of other villages are located outside the region at Cherrybrook and Castle Hill. A footpath was constructed in 1994 between the village and the Galston shopping centre to assist the movement of aged pedestrians between these two locations.

In the past, senior citizens were generally regarded as those persons over the age of retirement (ie, 65 years of age). This view has changed in recent times due to changing work trends, economic rationalisation and a greater dependence by persons on superannuation. The result being that a far greater number of the community are retiring earlier. One impact of this has been the growth in retirement style housing within established suburbs outside the study area. At present 16.4% of the population of the study area are over 55 years of age and is expected to increase over the next 15 to 20 years. As the population ages in the next 15 to 20 years the number of persons in this age group is estimated to increase further above the Sydney average and will place increased demands on aged services and alternative housing types.

As highlighted by the comment from the Galston Community Health and Resource Centre many aged persons are isolated on rural properties and have difficulty moving within and beyond the study area because of poor transport. The aged

are required to rely on family, friends or the community bus for mobility. This can result in a return journey to the shops or health services becoming an all day outing and causing distress to the person.

The ease of movement at shopping centres also needs to be considered for the aged and frail. Steps, gutters and broken footpath are obstacles which are not easily negotiated and can result in injuries.

Services should be centrally located within the commercial areas to provide easy access. Similarly, the establishment of retirement villages or retirement style living away from residential and commercial areas should not be encouraged as it isolates the residents from shops, community and health services.

10.2.9 Services for the differently abled

There is no information on the number of disabled or differently abled persons within the study area. There are persons in the study area that have difficulties with mobility, sight, hearing and other functions or actions.

Warrah at Dural provides a variety of services for persons with intellectual disabilities, including:

- * a school which provides education for approximately 18 intellectually disabled children ranging from 9 to 16 years of age, the majority of whom reside at the school during the week;
- * housing on-site and off-site for 65 persons;
- * a bio-dynamic vegetable farm;

- * a packaging and assembling enterprise;
- * an adult life skills training centre; and
- * finding employment opportunities for clients.

It is important that all residents are integrated into a community and not excluded. Retail areas, car parks, recreational areas and public buildings should be available to be used by all persons, despite their abilities. While all persons should have the choice of housing and area to live in, the separation and isolation of some persons from community, medical and retail facilities may affect the person's well-being and create difficulties with the provision of community services. Accordingly, facilities for differently abled persons should be located in or close to the village areas.

10.3 Community Preferences

The residents' survey sought responses on the adequacy of community facilities. The responses for the entire study area revealed that library services (63%), childcare (66%), senior citizen (70%), education (68%), emergency services (54%), community centres (75%) and medical services (70%), were considered to be adequately provided. However, 67% of the responses considered that youth centres and facilities for the youth were inadequate.

Table 10.4, below, provides a summary of the perceived adequacy of community facilities on a locality basis, however insufficient responses were received from Laughtondale, Maroota and Fiddletown to assess community attitudes from the localities.

Table 10.4
Adequacy of community facilities

Locality	Library Services	Youth Centres	Child Care	Senior Citizens	Education	Emergency Services	Community Hall	Medical services
Arcadia	A	I	A	A	A	I/A	A	A
Berrilee	A/I/A	A	A	A	A	A	A	A
Canoelands	I	I	I	I/A	A	I/A	A	A
Dural	A	I	A	A	A	A	A	A
Forest Glen	A	I	A	A	A	A	A	A
Galston	A	I	A	A	A	I/A	A	A
Glenhaven	A	A	A	A	A	A	A	A
Glenorie	I/A	I	A	I/A	A	I/A	A	A
Middle Dural	A	I	A	A	A	A	A	A
Wisemans Ferry	I	I	A	A	I/A	I/A	A	I/A

Note: I = Inadequate, A = Adequate, I/A = similar number of responses

Table 10.4 indicates that community facilities were generally perceived to be adequate by residents of all localities, except Canoelands and Wisemans Ferry. Residents of Canoelands are located midway between facilities provided at Glenorie and Maroota-Wisemans Ferry. Given the small population of Canoelands, it is unlikely that a full range of community facilities can be provided in the area. However, as discussed earlier, the construction of a community hall should be considered. The residents of Wisemans Ferry also rate library services as inadequate, probably due to the isolation from library services as a result of the 30km journey to Galston or Dural libraries.

10.4 Community Service Needs

The review of the population profile, provision of existing facilities and community preferences has highlighted that the critical areas to be considered in terms of service relate to youth, library services and the aged.

In terms of the needs of teenagers, consideration should be given to proposals that may support their nocturnal and diurnal social needs such as coffee shops/cafes, low cost restaurants, youth drop in centres and active recreation facilities.

With regard to library services, it is appropriate that a review of Galston library be undertaken after the Central Library at Hornsby and Pennant Hills Library have been relocated to their new sites. It is noted that any review should examine the opportunities for library facilities provided to the more isolated settlements in the rural area.

As the population ages there will be a demand for retirement style housing such as villas and retirement homes. Consideration should be given to proposals that will provide this type of accommodation in the village areas to give residents the opportunity to remain living in the area with which they have ties. Additionally, there may be a need to provide additional local medical facilities.

Mobility within and beyond the rural area is a problem for all sectors of the community, especially the young, teenagers and the aged. The low population densities mean that public transport services are not economically viable and transportation for the groups dependent upon public transport is limited. The increased provision of public transport should be encouraged. Additionally, the provision of

additional community buses to service the region should be considered.

10.5 Community Issues and Services Conclusion

In general, the rural communities are well served by community facilities, however some deficiencies exist. Community services and facilities should be directed to those parts of the community most in need. Within the region, a significant proportion of the population is either young or reaching senior citizens status. Existing facilities do not adequately cater for these groups.

The demand for additional facilities for the teenage population was highlighted in the resident survey. Additional recreational and social/meeting facilities should be provided for this age group. It is expected that a high demand for youth facilities will continue for the next 5 years.

The role and function of Galston Library should be reviewed following an assessment of the impact of the relocation of the Central Library in Hornsby and Pennant Hills Library to larger premises.

The demand for facilities for senior citizens will also increase in the coming years as the population ages. Housing strategies which allow aged accommodation within the village areas should be pursued. Additional medical facilities for the aged will also be required in the future.

Improved transport facilities are required for all sectors of the community, especially the young, teenagers and aged, who are more dependent upon public transport. The improved provision of public transport should be encouraged. Consideration should be given to the provision of additional community buses to service these age groups.

CHAPTER ELEVEN - RECREATION RESOURCES

Recreation resources can make a significant contribution to the community's physical, social and emotional well-being. Planning for these resources is important to meet both existing and future needs. This part of the Study will review the supply and demand of recreation resources to enable the preparation of an open space strategy for the area. Given the proximity of the Study area to the surrounding bushland within Marramarra National Park and the Berowra Valley Bushland Park, the focus in this evaluation will be upon formal public open space settings as opposed to natural settings. As with community services, the facilities within Baulkham Hills Shire will also be considered as residents rely on facilities provided by both Hornsby and Baulkham Hills Councils.

11.1 Supply of Open Space

The first step in preparing an open space strategy is the development of an inventory comprising details of the categories of open space and their quantity, quality and capacity for expanded usage. The Study Area contains local, district and regional open space.

Local open space is land used primarily for localised recreational purposes. These lands comprise neighbourhood parks, children's playground areas, passive reserves and drainage reserves. The primary use of these lands is for the recreation of residents within the Study Area, including picnicking, walking, relaxing, exercising and children's play areas.

District open space is land used primarily for district sporting events and generally comprises playing fields and district sporting facilities, including Dural Park, Galston Park, Glenorie Oval, Dural Squash Centre, and Glenorie and Wisemans Ferry Bowling Clubs.

Regional open space caters for users prepared to travel some distance from within and outside Hornsby Shire and includes Marramarra National Park, Berowra Valley Bushland Park and Fagan Park. These lands generally form part of a vast network of open space facilities and provide a regional resource for passive recreational pursuits such as bushwalking or picnicking. The Hawkesbury River and Berowra Creek while not being land based open space are also regionally significant recreation areas. Local, district and regional open space facilities within the study area are summarised in Table 11.1.

Table 11.1
Existing Open Space

Location	Setting	Type
Round Corner Ellerman Park-Kenthurst Road (BH)	Bushland, small cricket ground, memorial garden, community buildings	District
Spring Street (BH) Dural Recreation Centre (BH)	Playground Multi-purpose hall	Local District
Dural Gilbert / Old Northern Road intersection (BH) Porter Scenic Lookout-Old Northern Road(BH) Dural Country Club-Old Northern Road (BH) Dural Park-Quarry Road (H) Cumberland State Forest-Paragon Drive (H) Dural Squash Centre-Old Northern Road (H) Dural Driving Range-New Line Road (H)	Picnic Picnic Bowls Oval, tennis Bushland Squash Golf Driving range	Local Local District District District District District Regional
Galston Galston Park-Galston Road (H)	2 soccer, 2 netball, bushland, 1 cricket, pool, picnic	District
Fagan Park-Arcadia Road (H) Pony Club-Johnson Road (H)	Bushland, picnic, tourist Pony Club	Regional Regional

Sallaway Road reserve-Sallaway Road (H)	Bushland	District
Arcadia		
Arcadia Park-Arcadia Road (H)	1 cricket, 2 practise wickets, bushland	District
Fiddletown		
Motor cross track-Pebbles Road (H)	Motor cycletrack	Regional
Colah Creek reserve-Sunnyridge Road (H)	Bushland	District
Berowra Waters		
Berowra Waters	Bushland, picnic, waterway	Regional
Glenorie		
Glenorie Park-Old Northern Road (H)	1 cricket	Local
Glenorie Oval-Old Northern Road (BH)	1 cricket, 2 practise wickets, 1 soccer, 4 tennis	District
Glenorie Bowling Club-Old Northern Road (BH)	Bowls	District
Cairnes Road (H)	Playground, bushland	Local
Taupo Road (H)	Bushland	Local
Tekapo Road (H)	Bushland	Local
Maroota		
Maroota State Forest (BH)	Bushland	Regional
Wisemans Ferry		
Wisemans Ferry Oval (H)	1 cricket, 2 practise nets, tennis, playground, picnic	District
Wisemans Ferry Park (BH)	Picnic	Regional
Wisemans Ferry Golf (BH)	9 holes	Regional
Singleton Road	Bushland	Local
Wisemans Ferry Bowling Club (H)	2 greens	
Regional reserves		
Berowra Valley Bushland Park (H)	Bushland	Regional
Marramarra National Park (H)	Bushland	Regional

Note : (H) = Hornsby Shire, (BH) = Baulkham Hills Shire

The region also contains 9 primary schools, 1 high school and 4 private schools which provide open space areas and recreation facilities. It is apparent from the supply and distribution of existing open space that the isolated nature of each village within the Study area has generated a need for recreational facilities within each village.

11.2 Identification of Needs

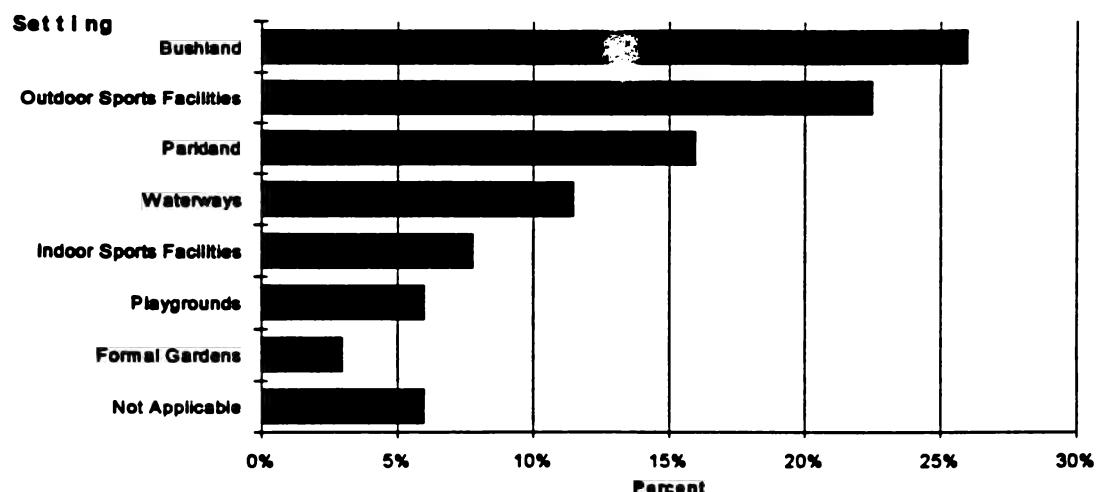
Having established the supply of open space, it is necessary to identify the recreational needs of the community. It is now widely accepted that the application of rigid standards to the provision of open space must be balanced with other factors such as quality, variety and types of open space, and resident preferences. Accordingly, open space needs should be measured on the basis of resident surveys, variety of open space, accepted standards and population characteristics.

The Hornsby Shire Recreational Needs Study (Manidis Roberts, 1991) provides findings and

recommendations on the recreation needs of the Shire and can be used as the primary data source for identifying recreational needs. Figure 11.2 indicates the preferred public recreational settings derived from the Recreational Needs Study.

To supplement the 1991 Recreation Needs Study and gauge resident preferences, a recreation survey was undertaken for the Rural Lands Study. The survey revealed a marked preference for bushland settings within which recreation including bushwalking, picnicking and scenic appreciation can be undertaken. The extensive bushland surrounding the rural areas provides significant opportunities for bushwalking and scenic appreciation. Formal picnicking facilities are limited, unless a trip to Wisemans Ferry, Galston or Berowra Waters is undertaken. The survey also found that the general community had a strong preference for providing recreational activities for youth. These facilities are limited in the Study Area and should be supplemented.

Figure 11.2
Preferred Recreational Setting



The resident survey also sought information about the usage and adequacy of open space facilities in the area. The majority of responses indicate that playing fields and sporting facilities are more frequently used on a weekly basis whereas regional parks, walking trails, picnic areas and waterways are more frequently used on a monthly or yearly basis. The frequency of use for playgrounds is similar on a weekly, monthly or yearly basis. There was a low response for playgrounds probably as a result of the use of rural properties as play areas for children. More than 50% of respondents indicated that each of the different types of recreational facilities are adequate in their area.

An assessment of open space needs should also be undertaken on an analytical basis using

appropriate standards. Due to the size of the Study area and the different open space requirements of residents in the villages and rural localities, this assessment is most appropriately undertaken in terms of local, district and regional facilities.

11.2.1 Local Open Space

Local open space facilities, such as neighbourhood parks and children's playground areas, are only required in the village areas to serve the village population. There is less need for these facilities in the rural localities as children are able to play on rural properties. Table 11.2 below, summarises the benchmark standards outlined in the Recreation Needs Study for the provision and supply of local open space for the villages areas.

Table 11.2
Provision of Local Open Space

Suburb	Population HSC	Facility Type	Facility Ratio	Facilities Required	Facilities Provided	Balance
Dural	200 ⁽¹⁾	Neighbourhood Park	1:2000	1	0	-1
		Playground	1:1000	1	0	-1
Galston	1203	Neighbourhood Park	1:2000	1	0	-1
		Playground	1:1000	1	0	-1
Glenorie	477	Neighbourhood Park	1:2000	1	1	0
		Playground	1:1000	1	1	0
Wisemans Ferry	200 ⁽¹⁾	Neighbourhood Park	1:2000	1	0	-1
		Playground	1:1000	1	0	-1

Notes: (1) Population estimates based on properties within immediate area of Dural Village and Wisemans Ferry Village.

The above table demonstrates that sufficient neighbourhood parks and playgrounds are provided in Glenorie, while there is a deficiency of playgrounds and neighbourhood parks in Dural, Galston and Wisemans Ferry. As part of the future planning for these areas, land should be set aside and developed for playgrounds and neighbourhood parks.

A primary goal of any local open space strategy should be for the provision of the greatest variety of open space to the greatest proportion of the population as possible. However, this goal will be tempered by the availability of resources and therefore requires the establishment of base standards and priorities. An emphasis should be placed on ensuring reasonable accessibility to facilities such as playgrounds and neighbourhood parks which should be within a reasonable walking distance. A reasonable walking distance to a neighbourhood park or playground is considered to be 500m which represents on average a 7 minute walk (DOP, 1992). The small size of these villages, means any local park in a village would be accessible to most local residents, based on this criteria.

Glenorie Park is centrally located, and all properties in Glenorie within Hornsby Shire, are less than 500m from the Park. Access to the Park may be gained via Old Northern Road or a pathway from Wanaka Place. The playground off Cairnes Road is accessible to residents in the southern half of Glenorie. Glenorie Public School also serves a local open space function.

Similarly, future provision of playgrounds and neighbourhood parks in the villages of Galston, Wisemans Ferry and Dural should be centrally located.

11.2.2 District Open Space

District open space includes picnic facilities, sportsfields, tennis/netball courts which serve the wider community rather than just the immediate area. The Study area has been subdivided into five districts to compare the provision of district open space facilities against the adopted benchmarks (table 11.3). The five districts represent the five population catchments which require individual district open space facilities. The population is made up of residents from both Baulkham Hills Shire Council and Hornsby Shire Council.

Table 11.3
Provision of District open space

District	Persons	Facility Type	Facility Ratio	Facilities Required	Facilities HSC	Facilities BHSC	Balance
Dural Round Corner	4838	Picnic facilities	1:5000	1	0	2	+1
		Winter sportsfield	1:2200	2	1	1	0
		Summer sportsfield	1:2900	2	1	1	0
		Tennis courts	1:1300	3	2	0	0
		Netball/basketball	1:2500	2	0	2	0
		District park	1:5000	1	0	1	0
Galston Middle Dural	3912	Picnic facilities	1:5000	1	2	0	+1
		Winter sportsfield	1:2200	2	2	0	0
		Summer sportsfield	1:2900	2	1	0	-1
		Tennis courts	1:1300	3	0	0	-3
		Netball/basketball	1:2500	2	2	0	0
		District park	1:5000	1	1	0	0
Arcadia/ Berribee Berowra Waters	1971	Picnic facilities	1:5000	1	1	0	0
		Winter sportsfield	1:2200	1	1	0	0
		Summer sportsfield	1:2900	1	1	0	0
		Tennis courts	1:1300	1	0	0	-1
		Netball/basketball	1:2500	1	0	0	-1
		District park	1:5000	1	0	0	-1

Glenorie	3253	Picnic facilities	1:5000	1	0	0	-1
Canoelands		Winter sportsfield	1:2200	2	1	2	+1
		Summer sportsfield	1:2900	2	1	1	0
		Tennis courts	1:1300	3	0	4	+1
		Netball/basketball	1:2500	2	0	0	-2
		District park	1:5000	1	0	1	0
Maroota	1739	Picnic facilities	1:5000	1	1	1	+1
Wisemans		Winter sportsfield	1:2200	1	1	0	0
Ferry		Summer sportsfield	1:2900	1	1	0	0
		Tennis courts	1:1300	1	2	0	+1
		Netball/basketball	1:2500	0	0	0	0
		District park	1:5000	1	0	1	0
Rural lands	15,713	Picnic facilities	1:5000	3	4	3	+4
		Winter sportsfield	1:2200	7	6	3	+2
		Summer sportsfield	1:2900	5	5	2	+2
		Tennis courts	1:1300	12	4	4	-4
		Netball/basketball	1:2500	6	2	2	-2
		District park	1:5000	3	1	3	+1

The provision of district open space facilities against the adopted benchmarks, for the entire study area, including Hornsby Shire Council and Baulkham Hills Shire Council, can be seen in the table. Three of the five districts require the provision of further district open space facilities. In the event that population numbers increase, additional recreation facilities will need to be provided.

The table demonstrates that provision of district open space facilities across the entire study area is above that required for picnic facilities, winter sportsfields, summer sportsfields and district parks. There is, however, a deficiency in the provision of tennis courts and netball/basketball facilities.

The table also demonstrates that the provision of district open space varies between identified areas and that the total population for some of the areas is significantly less than the minimum population for the facility. For example, the provision of a district park for the Arcadia - Berribee - Berowra Waters and Maroota - Wisemans Ferry area is not appropriate as the population of these areas is less than 50% of that necessarily indicated by the standard. Nevertheless, the requirements have been rounded up, as half a district park or any other facility cannot be provided. Despite its small population a District Park is located at Wisemans Ferry.

The Dural - Round Corner and Maroota - Wisemans Ferry districts are well served by district recreational facilities. The Galston -

Middle Dural and Glenorie/Canoelands districts also generally well served by district recreational facilities. There is however, a deficiency of a summer sports field and tennis courts in the Galston - Middle Dural district. The table also indicates insufficient provision of a picnic facility and netball/basketball courts for the Glenorie - Canoelands area. In comparing the total population of this area with the facility ratio numbers, the table is best interpreted as demonstrating a need for the provision of one netball/basketball facility in the Glenorie - Canoelands area. A similar interpretation may be made in respect of facility provision to the Arcadia - Berribee - Berowra Waters district. Given the population total and comparative facility ratio there is a need for the provision of at least one tennis court and one netball/basketball court in the district.

Council's Parks and Landscape Team have prepared Masterplans for Galston Reserve, Wiseman's Ferry and Glenorie Park as part of the Urban Parks System for the Shire of Hornsby. The masterplans serve to guide any upgrading of these parks, taking advantage of existing leisure and recreational facilities. The plans were prepared by Council in 1989. It is considered appropriate in any review of the masterplans, that the above shortfalls in provision of district open space be incorporated into these plans.

Indoor recreational facilities such as squash courts and gymnasiums also serve the district population, however these facilities are generally

provided by the private sector based on market analysis.

11.2.3. Regional Open Space

Regional open space facilities include swimming pools, golf courses, athletics tracks, leisure centres, and regional parks. These facilities serve the regional community and the provision and needs are summarised in Table 11.4.

The table demonstrates that the rural lands are well served by regional open space. The provision of regional open space equals or exceeds facility requirements based on population numbers. One exception is noted in respect of the provision of a regional sportsfield. Given the low population of the rural area and the nearby Greenway Park, Cherrybrook, a regional sportsfield is not warranted. As noted previously, results from the Recreational Needs Study (1991) indicate a marked preference for bushland settings, within which bushwalking, picnicking and scenic appreciation can be undertaken. The extensive bushland resource of the study area provides this opportunity for these recreational activities.

The Hawkesbury River and Berowra Creek are also utilised for recreation by the regional population. Boating and fishing activities are usually undertaken on an informal basis, although activities concentrate on access points, such as boat launching ramps and water ski parks. Facilities for water skiers are generally provided upstream of Wisemans Ferry in Baulkham Hills Shire, where the Hawkesbury River has fresh water.

11.3 Future open space requirements

To determine future open space needs, it is necessary to compare the forecast population with the existing and proposed supply of open space. Given recent trends in population growth it is unlikely that future demands for additional open space will be high. It is expected that the existing population profile will continue to age, which will result in a decreasing demand for playgrounds and increase demand for outdoor sporting facilities (ie. tennis, sportsfields), picnic facilities, golf courses and bowling greens. Population trends and demand for open space facilities should be reviewed, if zonings and subdivision standards are varied.

Table 11.4
Provision of regional open space

Region	Pop.	Facility Type	Facility Ratio	Facilities Required	Facilities HSC	Facilities BHSC	Balance
Rural	15713	Swimming pool (50m)	1:30000	1	1	0	0
		Regional parks	1:20000	1	3	2	+4
		Golf Course (18 hole)	1:50000	1	0.5	0.5	0
		Golf driving range	1:50000	1	1	0	0
		Athletics track	1:40000	1	1	0	0
		Leisure centre	1:50000	1	1	1	+1
		Bowling green	N/A	N/A	1	2	N/A
		Regional sportsfield	1:100000	0	0	0	0
		Boat ramp	1:10000	2	1	1	0
		Formal gardens	1:100000	0	1	0	+1
		Bushland	N/A	N/A	2	1	N/A

11.4 Recreation Resources Conclusion

Open space and recreational facilities are important elements of a planning strategy for the area. The Recreational Needs Study provides the basis upon which the provision of open space and recreation facilities can be evaluated. The rural lands generally are well served by bushland reserves and local, district and regional open space facilities. A deficiency in the provision of 5 tennis courts and 2 netball/basketball facilities, comprising district open space facilities, has been identified for the study area. Further, a deficiency of local playgrounds and neighbourhood parks have been identified for the Villages of Dural, Galston and Wisemans Ferry. An open space plan which sets Council policy for the allocation and use of existing and future open space would assist in ensuring that the provision of resources are better matched to community needs. Open space and recreation resources should be reviewed in the event that population trends are altered as a result of rezoning or subdivision standards.

CHAPTER TWELVE - SITE SPECIFIC AREAS

During the course of this study there were a number of issues raised concerning the zoning or development of particular areas, which require specific attention. The areas include South Dural, Fiddletown-Arcadia-Berrilee and lands adjacent Galston and Mid-Dural Roads.

12.1 South Dural

The precinct known as South Dural is bounded by New Line, Hastings and Old Northern Roads and is located within the suburbs of Glenhaven, Round Corner and Dural (Figure 12.1). The precinct has an area of some 230 hectares and is located within the Georges Creek catchment. The precinct was the subject of a rezoning submission to Hornsby Council, proposing the rezoning from Rural B to Residential to enable the urban development of the area. The minimum subdivision size for lands zoned Rural B is 2 hectares. The precinct contains 135 lots with the average allotment size being 1.8ha.

Background

The future of the precinct has been the subject of debate since the development of the Cherrybrook Residential Precinct in the 1970's to 1990's, with speculation on the extension of the residential area. The precinct is not currently recognised in the State Government's Urban Development Program. However, in 1989, the area was included in the medium term Urban Development Program. The medium term list has since been abandoned by the Department of Urban Affairs and Planning as it created land speculation and uncertainty for residents.

A company has purchased a number of properties, totalling 60ha, within the precinct in anticipation of a zoning change. The company has completed a number of environmental reports and in March, 1995, lodged a submission with Hornsby Council seeking the rezoning of the precinct from Rural B to Residential. Submissions have also been received from a resident group supporting the rezoning and another resident group opposing the rezoning.

The rezoning proposal submitted by the development company contained reports addressing the possible development of the precinct, soil conservation, water and sewerage, aboriginal archaeology, flora and fauna, stormwater management, the urban development

program and the employment lands development program, and traffic impact.

The Executive Summary of the submission concludes:

"In summary, the work to date demonstrates -

- the land is suitable for urban development;*
- it is to be readily serviced;*
- urban development would meet a local and regional need;*
- urban development can be carried out in an environmentally sensitive manner, including the restoration of habitat and contributing to improved water quality for the entire catchment;*
- the holding consolidated by Cloudford is the logical Stage 1 of urban development;*
- urban development is supported by the majority of landowners in the area;*
- urban development of the area would be by way of 'infill' of existing urban areas, using existing services capacity, and not compromising any rural values."*

A report on the rezoning submission was considered by Council on 3 May, 1995, whereupon Council resolved not to proceed with the consideration of the submission and the rezoning of the land. Notwithstanding, the zoning of the land is subject to review under this study as is all other land within the rural area.

Planning Context

The rationale for continuing urban development into the South Dural precinct should be considered within the broader planning context rather than by individual area or precinct. The South Dural precinct could be considered as a logical extension to the existing urban areas of Cherrybrook and Castle Hill, without representing a departure from established urban development patterns. However, this in itself does not represent a reason to pursue the rezoning of the land for urban development. The urban development of the land should be evaluated in the context of the constraints to urban development and the demand for additional

housing along with the appropriate location of any additional housing.

Land use patterns within the Shire are regulated by the Environmental Planning and Assessment Act, 1979 and decisions for land use direction are the responsibility of Hornsby Council. The extent of urban development within both the Shire and the broader Sydney region should be considered holistically rather than in response to individual pressure to develop a particular area or areas of land. The opportunity and ability to convert non-urban land into urban land does not, in itself, represent adequate justification for such an action and any rezoning should not be predicated on an underlying assumption that rural land on the urban fringe will by "natural" expansion become urban. Rather the conversion of land to an urban zoning should be based on sound planning rationale and strategic assessment.

Such strategic assessment should examine the appropriateness of providing further housing on the urban fringe of Hornsby Shire. The assessment would require Council policy direction on providing more housing either at the fringe or within existing urban areas and whether Council would seek to impose a limit to urban areas throughout Hornsby Shire and consequently population growth. Such a limit could well be acknowledged as appropriate in the Berowra Creek Catchment given the objectives of the Community Contract to improve water quality in Berowra Creek.

It is noted that any move to set limits on housing and population may be influenced by regional or local initiatives to encourage more housing in the Shire. If it is established that more housing is appropriate, then an assessment of the following three broad policy options could be considered:

1. Increased consolidation measures throughout established urban areas of the Shire and containment of urban expansion at the fringe.
2. Releasing additional urban land at the fringe and relieving the pressure for consolidation within established urban areas.
3. A combination of urban expansion and consolidation.

Any of the above three options would have to be examined having regard to the environmental implications, the demographic profiles of the Shire, the available infrastructure and the community aspirations.

It is beyond the scope of this study to examine these options in any detail. However, it is acknowledged that if additional housing and population growth in Hornsby Shire is considered appropriate and options 1 and 2 were favoured, then the South Dural Precinct should be investigated for urban release. Accordingly, a preliminary assessment of the areas urban capability is warranted.

Evaluation

The purpose of this section of the study is to briefly evaluate the proposal, the zoning issues and constraints to urban development in the precinct. It is submitted that the most appropriate means to evaluate the zoning of the lands is to consider the whole of the South Dural Precinct. Failure to consider the whole precinct could prejudice future opportunities for sound planning and the expectations of individual property owners.

The major issues to be considered in determining the future planning options for the study area beyond those of the previously mentioned strategic issues, are the capability of the land to support urban development, the availability of infrastructure, heritage, visual amenity and traffic. These issues will be addressed to ascertain the short term and long term planning options for the South Dural area.

Natural Environment

As discussed in Chapter 4, the natural environment provides both opportunities and constraints for future development of the Study Area. Human occupation has altered the appearance and function of much of the South Dural precinct. Land clearing for agriculture has removed much of the natural vegetation, modified the natural topography and altered drainage patterns in the area. Nevertheless, the natural environment continues to influence the area, remaining a constraint to the development of land. The natural environment also serves to enhance the amenity of the precinct.

Topography: The topography of the area has resulted from the erosion of the underlying Wianamatta Group of shales and Hawkesbury sandstone. The Wianamatta Group outcrops along the ridge followed by Old Northern Road, whereas the Hawkesbury sandstone occurs within the centre of the precinct adjacent to Georges Creek. The slopes associated with the Wianamatta Group are gentle ranging from flat to

20%, whereas the slopes associated with the Hawkesbury sandstone, along Georges Creek, are more steep ranging from 10% to over 25%. In this and previous studies adopted by Hornsby Council, slopes greater than 20% are generally considered to be unsuitable for urban development, due to site stability, erosion hazard and engineering difficulties associated with road, drainage and building construction. It would be appropriate that the planning controls for these areas reflect the topographical constraints.

Soil Landscapes: Soil landscapes are areas of land that have specific and recognised topographies and soils, that can be presented on maps, and can be concisely described in statements. Chapter Four of this Study examined the soil capability of each soil landscape found within the Study Area and established the principles that will be used in this assessment.

The South Dural precinct contains three soil landscape units namely, the Glenorie, Lucas Heights and Gymea Soil Landscapes. The soils associated with the Glenorie landscape are shallow to moderately deep and occur on undulating to rolling low hills on Wianamatta Group shales. The typical limitations of these soil landscapes are high soil erosion hazard, localised impermeable highly plastic subsoil and the soils are moderately reactive.

The soils associated with the Lucas Heights soil landscape are moderately deep and occur on gently undulating crests and ridges on plateau surfaces of the Mittagong formation. The typical limitations of these soil landscapes are stony soil, low soil fertility, and low available water capacity.

The soils associated with the Gymea soil landscapes are shallow to moderately deep and are characterised by undulating to rolling rises and low hills on Hawkesbury sandstone. The typical limitations of these soil landscapes are localised steep slopes, high soil erosion hazard, rock outcrop, shallow highly permeable soil, and very low soil fertility. Following the identification of the prominent soil landscapes within South Dural, it is appropriate that their capability for urban and rural development is determined.

Urban capability, in respect to soil landscapes, is the ability of land to support a particular intensity of urban development without serious erosion and sedimentation occurring during construction, as well as possible instability and drainage problems

in the long term. The Soil Conservation Service (SCS) has classified the soil landscapes into three broad categories for urban development, being high capability, low to moderate capability and those not capable of urban development.

Rural capability is the ability of an area of land to sustain permanent agricultural or pastoral production without permanent damage. The SCS has also classified land into the three broad categories for rural development, being capable of regular cultivation, capable of grazing and not capable of regular cultivation or grazing. A summary of the erosion hazard and capability of the soil landscapes is provided in Table 12.1.

The Glenorie soil landscape is considered to have a low to moderate capability for urban development and is generally capable of being grazed and regularly cultivated. The Lucas Heights landscape is identified as being of high capability for urban development and is generally capable of supporting grazing with some localised areas capable of regular cultivation. The Gymea landscape is considered to be of low to moderate capability for urban development and lands containing this soil landscape are not considered capable of being grazed or cultivated. Planning of any local area requires more intensive capability assessments, examining additional factors such as slope, angle, position on slope, terrain element and specific soil conditions.

The South Dural rezoning proposal submitted to Council included a soil conservation report undertaken in April, 1990. The study was prepared to provide information regarding the physical limitations to the development of South Dural. The study particularly identified necessary soil conservation safeguards to mitigate soil erosion and sediment pollution of Georges Creek and Pyes Creek should urban development proceed.

The consultancy report broadly identifies the physical limitations involved in undertaking urban development of the area. While the parameters are clearly established, the report fails to identify individual areas that are capable or incapable of supporting urban development, although the report identifies all soil landscape types as having a high or extreme degree of physical limitation to earthworks for urban development on slopes greater than 20%. The report places an emphasis upon the works that may be undertaken to conserve soil.

Table 12.1

Summary of Soil Landscapes

Soil Landscape	Slope	Mass movement hazard	Surface movement potential	Erosion hazard (subsoil-topsoil loss)	Urban capability	Rural capability
Glenorie	Undulating to rolling	Low	Moderate	Moderate to high (65 - 117t/ha)	Low to moderate	Generally capable of being grazed and regularly cultivated.
Gymea	Undulating	Low	Low	High to extreme (19 - 464t/ha)	Low to moderate	Not considered capable of being grazed or cultivated.
Lucas Heights	Gentle	Low	Low	Moderate to high (103 - 97t/ha)	High	Capable of supporting grazing with some localised areas capable of regular cultivation.

It may be concluded that the majority of areas within the study area are capable of supporting some urban development. The degree of urban development is reliant upon the slope of the land and the characteristics of each soil landscape. The potential urban development of the land should also be balanced against the opportunity to undertake rural pursuits on the land.

Agricultural Classifications: Agricultural capability is a measure of the ability of land to support permanent agriculture or pasture production without permanent damage. The Agriculture Classification by NSW Agriculture indicates three classes of soils within the study area, classes 2, 3 and 5. A small parcel of class 2 soils is located in the southern portion of the area. The majority of the study area contains class 3 soils, while the class 5 soils are found on the steeper, vegetated lands adjacent the creeklines. Those lands identified as containing soils of class 2 and 3 agricultural suitability are considered valuable agricultural resources. The classifications indicate that approximately two thirds of the South Dural precinct is suited to either cropping, grazing or pasture improvement. It may therefore be concluded that the South Dural precinct can sustain agricultural activities.

Flora and Fauna: The South Dural precinct contains a large portion of remnant bushland that provides a habitat and corridor for fauna. The bushland follows Georges Creek valley which occupies the central portion of the precinct. Georges Creek drains the entire precinct, flowing south and exiting the precinct to the east across the junction of Hastings and New Line Roads. The Hornsby Shire Bushland Survey (Smith and Smith) was completed in March 1990. The survey was undertaken by consultants on behalf of Hornsby Council.

The survey identified three plant communities in the South Dural precinct. These are plant community J: a tall open-forest characterised by Eucalyptus saligna, plant community K: a tall open forest characterised by Eucalyptus pilularis - Eucalyptus saligna - Eucalyptus paniculata, and plant community L: a tall open forest characterised by Eucalyptus pilularis - Angophora costata - Syncarpia glomulifera.

The survey made the following observations in respect to the plant communities J, K and L;

"Despite the large area of major reserves, the plant communities of more fertile soils are poorly represented. In particular, the three plant communities associated with the

Wianamatta Shale areas in the south and west of the Shire have been largely cleared and the remnants lie mostly outside the major reserves. Communities J and K now covers only a very few hectares on the fringes of Berowra Valley Bushland Park.....

and;

Community L which is associated mainly with gullies, has been less affected by clearing and is now the most extensive of the taller forest communities in the Shire."

The consultant's report submitted with the rezoning application undertook a detailed assessment of the conservation significance of the vegetation, and noted:

"No endangered plants were located during the field investigations in South Dural, although two regionally significant species were located along the Georges Creek valley. The vegetation communities present are generally well-represented in reserves in the Sydney region, although the Tall Open Forest along Georges Creek is of moderate conservation value."

and;

". . . the forest community along the Georges Creek valley should be considered in further detail at the development design stage, with areas being designated for sensitive development, conservation, wetland treatment or recreation, as appropriate depending on conditions and characteristics."

The bushland along Georges Creek forms a habitat to fauna and forms part of a continuous bushland area to Berowra Valley Bushland Park. The continuous bushland area permits the movement of fauna from one location to another.

A fauna study was also undertaken by consultants as part of the rezoning submission and indicates that there are approximately 227 species of native vertebrate in the precinct. A number of additional fauna species are likely to be present in the precinct from time to time or depending upon seasonal change. The consultant fauna report concludes:

"the fauna recorded in the study area or in the vicinity are generally common to abundant and widespread, and are typical of such semi-urban sites. Many species are inhabitants of grassland or open woodland

communities, tolerant of the disturbed habitats characteristic of the study area. A significant number of forest and woodland dwelling species were recorded along the Georges Creek and its forested valley, despite the Creek corridor being somewhat disturbed in places. Of note is the scarcity of small native mammals and reptiles along the Creek compared to adjacent areas (which are contiguous with extensive forest stands).

Only one endangered fauna species (the Greater Broad-nosed Bat Scoteanax rueppellii) was located in the area, although a few other endangered species could occasionally be present."

The retention of core bushland areas which are capable of sustaining native fauna and flora in the long term is appropriate to ensure the maintenance of biodiversity. It would be appropriate that prior to any further consideration of rezoning, Council engage a suitably qualified consultant to undertake a comprehensive assessment of the fauna study submitted with the rezoning proposal to determine its adequacy and any recommendations for the protection of existing flora and fauna communities.

Infrastructure

In order to establish the supply of infrastructure available to the subject area, Hornsby Council has consulted with the various supply authorities.

The Australian Gas Light Company has advised that Natural Gas mains are located adjacent to the South Dural precinct and can be extended to supply same.

Telecom Australia have advised that there is no difficulty in providing telephone services to the area and would require a minimum of 8 months to plan, design and construct the network infrastructure into the area.

The Electricity Transmission Authority raised no comment or objection raised against the proposed rezoning.

Sydney Water has provided advice in respect to the provision of water and sewerage infrastructure. In terms of water supply, the precinct is located within the area serviced by the South Dural Reservoir located at the north east corner of the precinct. Sydney Water has advised that the South Dural reservoir is capable of providing water supply to some of the site,

however, supply to properties with high elevations within the area would require augmentation of the Dural Elevated reservoir system before any servicing can be provided.

With regard to sewerage, the South Dural lands are located within the catchment of the West Hornsby Sewerage Treatment Plant (STP). Any urban development within the South Dural precinct would require the provision of reticulated sewerage. The alternatives to reticulated sewerage, discussed in Chapter 7, cannot be implemented in urban areas given the effect upon water quality, ability of soils to absorb and filter waste water and the limited area to undertake on-site disposal.

Sydney Water has advised that the existing load on the West Hornsby STP is approximately 34,000 EP, which is 11,000 EP below the nominal engineering capacity of the plant under the current Environmental Protection Authority licence conditions. Work to upgrade the plant is expected to increase the plants engineering capacity to 46,500 EP. However, implementation of this upgrading will be subject to the findings of the Environmental Impact Statement (EIS) for the preferred option upgrading.

The load projections in Sydney Water's Options report predict that the 46,500 EP capacity for the STP will cater for the expected "high" load until year 2021 and an allowance of 59ha or 725 lots is made for South Dural. Recent advice from Sydney Water confirms that the increase in the engineering capacity of the plant could cater for 59ha or 25% of the area of the precinct. It is appropriate that in the event that any rezoning is considered, that any servicing of South Dural should be guaranteed to all properties within the precincts.

Sydney Water has advised that there is a commitment only to service currently zoned urban areas, including those on the Government's Urban Development Programme, despite allowances being made for possible additional areas in the population projections. Any additional areas requiring servicing should only be considered following the environmental impact assessment of Sydney Water's current proposals for the West Hornsby STP, as the findings of the EIS may have implications on the level of development that can be sustained in the Berowra Creek catchment.

The provision of a reticulated sewerage system to the South Dural precinct is therefore most appropriately considered only upon the findings

of the EIS, which is to be prepared and placed on public exhibition. Accordingly, it will remain unclear whether the subject area can be serviced in the short term until the findings of the EIS can be tested and the possible impacts on the environment of the catchment measured.

The findings of the EIS to be conducted in respect of Hornsby West STP will improve the engineering capacity of the STP. The engineering capacity takes into consideration the volume of sewerage that can be treated by the STP. However, the "environmental capacity" of the STP is unknown. While the STP may have the capacity to cater for further development, no measurement is provided to test the affect upon the water quality of Berowra Creek. Consistent with the precautionary principle of ecologically sustainable development, urban development should not occur within the area until it can be confidently demonstrated that the provision of sewerage services to the precinct will not adversely impact upon the environment.

The majority of infrastructure necessary for urban land can be provided to the subject area. Urban development of South Dural is, however, dependent upon sewerage servicing, given the area of land and the potential number of lots. Accordingly, any rezoning of the subject area should not be considered until it can be demonstrated that sewerage services can be provided to the entire South Dural area without detriment to the water quality of Berowra Creek.

Heritage

A heritage item may consist of a building, work, relic, place or tree which is considered to have heritage significance. It is appropriate that both Aboriginal heritage and European heritage of the South Dural precinct be considered.

Aboriginal Heritage: Consultants for Hornsby Council are currently preparing the Hornsby Shire Aboriginal Heritage Study, completion of the study is not anticipated until early 1996. As the study is being undertaken across the entire Shire, a detailed identification and assessment of Aboriginal heritage of the South Dural area will not be undertaken within Council's study.

The rezoning submission included an archaeological survey for Aboriginal sites. The study did not consider the entire precinct, rather the consolidated land holdings comprising a total of approximately 60 hectares. The report was

completed by a consultant archaeologist in November, 1994 and provides that;

"no archaeological sites or undisturbed areas of potential occupation deposit were identified within the study area. Aboriginal archaeological relics do not therefore constitute a constraint upon the proposed development. Aboriginal Heritage within the precinct is unlikely to pose significant constraints to rezoning, although would pose constraints to subsequent individual development opportunities. Accordingly, if the rezoning of the area were to proceed an Aboriginal Heritage Study should be undertaken for the entire precinct and Aboriginal Heritage identified and included in a Local Environmental Plan. Nevertheless, should any Aboriginal relics be encountered during the course of development, officers of the National Parks and Wildlife Service should be informed immediately."

European Heritage: European Heritage Items have been identified in the Hornsby Shire Heritage Study and are recognised in Schedule D of the Hornsby Shire Local Environmental Plan (LEP), 1994. Two heritage items exist within the South Dural precinct.

Sections of New Line Road, Dural have been listed as containing significant sections of bushland and minor cultural plantings that form an important landscape element of local significance. Trees located along the roadside include indigenous Blackbutt, Smooth Bark Angophora, Gums and Stringy bark to 25 metres in height and on Dural Plateau, occasional Radiata Pines to 23m from c1930's and Camphor Laurels to 12m from c1950's. No individual trees have been nominated in Schedule D.

Property No. 671 Old Northern Road, Dural has been identified in Schedule D of the LEP. The item represents a good example of a symmetrical Inter-War house that is suburban in character and therefore uncommon in this rural location.

Both heritage items are of local significance and any planning strategy developed for the South Dural precinct should seek to conserve these items.

Visual Amenity

As discussed in Chapter 9, the Rural Lands have a range of visual qualities and characters ranging

from the most spectacular in the State to more modest. Changes to land use and settlement pattern of the South Dural precinct has the potential to alter the visual quality of the precinct in the future. Accordingly, it is necessary to consider the visual quality and amenity of the South Dural precinct prior to any planning strategy being developed.

The visual amenity study carried out for the Rural Lands Study recognised 9 distinct landscape character types. The South Dural Area contains type 1 and type 2 landscape characteristics. The type 1 landscapes are the only examples in the Lower Hawkesbury region of the particular combination of cultural elements and Glenorie soil landscapes and are of regional significance. To preserve this visual amenity would require the retention and maintenance of intensive horticultural and agricultural uses of the land, combined with limitations on urban features such as street frontage treatments, excessive manicured areas, clearing of row and ornamental plantings and the like. Type 2 classified land is of local significance and is representative of the Hornsby area. To preserve this visual amenity would require the maintenance of agricultural uses and a rural character, while discouraging development of an essentially urban nature.

General views of scenic quality to the west exist along parts of Old Northern Road, which forms the western border to the South Dural precinct. These views are expansive, panoramic and complex. The main feature is that of the Blue Mountains Plateau, seen over the rural foreground and intervening Hills District. These views are considered to be of outstanding scenic quality and great beauty. As Baulkham Hills Council is located immediately west of Old Northern Road, these views cannot be readily protected by any planning strategy developed for the South Dural precinct. However, the planning strategy may adopt a principle of discouraging interruption to views to the west from any elevated portion of the South Dural precinct.

Any decision to introduce urban development into the precinct would immediately erode the visual amenity identified for the precinct. The visual amenity of the precinct is considered high, however not unique to the South Dural Precinct and other examples of type 1 and 2 lands are found elsewhere within the rural area. While the external views to the west are considered worthy of protection, any decision to introduce urban development to the South Dural precinct would not result in the loss of type 1 and 2 visual

environments from the Rural Lands of Hornsby Shire.

In the event that the rezoning of the area was considered, any detailed planning strategy should seek to identify and preserve significant views within the area and views from the area west to the Blue Mountains.

Transport

The South Dural precinct is served entirely by road in respect of transport. Any planning strategy for the future of the precinct must take into consideration the capacity of transport infrastructure. Accordingly, it is necessary that consideration be given to both public transport and traffic impacts.

Public Transport: As discussed in Chapter 8, public transport in the rural areas, including South Dural, is limited to bus and taxi services. The Glenorie Bus Company provides the main link from the precinct to Castle Hill, Eastwood and Pennant Hills railway station. Buses travelling to these destinations pass the South Dural precinct on the western side, providing transport opportunity for residents of Wayfield and Franlee Roads. Bus services are not provided along either Wayfield or Franlee Roads.

Traffic: The South Dural precinct is bounded by Old Northern and New Line Roads which are State roads under the control of the Roads and Traffic Authority. The Roads and Traffic Authority has not responded to a request by Council seeking comment in respect to the needs of the area and the rezoning submission.

The rezoning submission indicates that traffic improvement works may be required to roads to facilitate the increase expected from any urban development of the area. The following improvements may be required based on an assumption that 80% of the gross land area is allocated for residential purposes:

- * widen *Old Northern Road* to four lanes between *Wayfield Road*, *Hastings Road* and *Old Castle Hill Road*;
- * provide longer right turn lane on the eastern approach of *Old Northern Road/Kenthurst Road*;
- * provide longer shared left turn/through lane on the southern approach of *New Line Road/Hastings Road*; and

- * *install traffic signals at the intersections of Glenhaven Road/Old Northern Road and Hastings Road/Old Northern Road.*"

Any urban development of the South Dural area should also be in accordance with principles established in other urban release areas, such as restricting arterial road access points, establishing a road hierarchy which serves to encourage and control vehicular movements, and provide an internal road network that serves all residential properties and allows movement throughout the precinct and to adjoining precincts.

Until such time as there is a clear indication of the number of lots likely to result from any rezoning proposal, the capacity of the road system and necessary public transport and traffic system improvements cannot be accurately determined to support additional traffic. Notwithstanding, there is currently acknowledged traffic delays in the arterial road network that would be exacerbated by any urban development in the South Dural area.

Summary

It can be concluded that the South Dural precinct is capable of sustaining rural pursuits and may be capable of urban development. It is however appropriate that Council adopt a "precautionary" approach to considering the rezoning of the South Dural precinct to enable urban development. When Hornsby West STP has been upgraded and water monitoring of Berowra Creek has been undertaken to determine the environmental effectiveness of the upgrade, Council will be better placed to determine whether the rezoning of South Dural should be considered and the effect of such upon the water quality of Berowra Creek. It is at this stage that Council could undertake a comprehensive strategic assessment of the appropriateness of rezoning the precinct to enable additional housing. It is noted that such an assessment should provide a sound planning rationale and examine the appropriateness of providing further housing on the urban fringe of Hornsby Shire within the Berowra Creek Catchment.

The area adjacent to Georges Creek is incapable of supporting rural or urban activities due to environmental factors of slope, soils, fauna and flora. The cumulative affect of these environmental features reduce the capacity of the land to support any rural or urban activity. The existing zoning is not considered appropriate and

the zoning should be amended to an Environmental Protection B (River Catchment) zone to reflect the sensitive nature of the creek and adjoining land.

In the event that the South Dural area is rezoned in the future for urban purposes, an area specific Development Control Plan (DCP) would be required to provide direction in respect of issues discussed above.

12.2 Glenorie-Fiddletown-Arcadia-Berrilee

The Rural A zoning applying to parts of the Glenorie, Fiddletown, Arcadia and Berrilee area (Figure 12.1) has been the subject of some debate in recent years. In 1990, a submission on behalf of FAB5 (Fiddletown-Arcadia-Berrilee Residents for 5 acres) was lodged with Hornsby Shire Council seeking the rezoning of lands between Banksia Place and Nollands Road, Fiddletown, from Rural A to Rural B. The rezoning submission was not supported by Council and the matter was deferred for consideration in the Rural Lands Study.

In 1994, a submission was received from FAB5 entitled "A request on behalf of landholders within the Arcadia, Berrilee and Fiddletown area for 2 hectare subdivisions while retaining the rural atmosphere of the area." The submission requests the rezoning from Rural A to Rural B which would alter the subdivision standard from 10 hectares to 2 hectares. The FAB5 submission estimates that a maximum of 238 new allotments would be generated if the land was rezoned to allow a minimum allotment size of 2ha.

The rezoning submission indicates that there is a predominance of allotments within the area that have been previously subdivided to less than 4 hectares and that there are only 23 of 290 allotments with an area greater than 10ha, excluding land zoned Environmental Protection. The submission considers the majority of lands zoned Rural A south of Marramarra National Park, however, excludes portions of Rural A land in Glenorie. These lands have also been the subject of requests to Hornsby Council to reduce the minimum allotment size. Therefore, it is appropriate that the evaluation also include lands adjacent to the area nominated by FAB5 that are similar in zoning and planning issues.

Planning Context

In evaluating the merits of the proposal to alter the minimum subdivision standard, it is necessary

to make an evaluation based on the broad planning context and the specific issues of the individual precinct or area. The rezoning of Rural A land to Rural B in the subject area may be considered to be a logical extension to the existing Rural B lands based on existing subdivision patterns in the area. This in itself, however, does not represent a reason to pursue the rezoning of Rural A land to allow subdivision of the larger parcels.

Broad strategic assessment of the proposal needs to consider the implications of the reduction in size of large rural land holdings, providing additional housing beyond the urban fringe, the environmental implications and community aspirations. Specifically, consideration needs to be given to the issues of the provision of infrastructure, the constraints and opportunities provided by the natural environment, and the ability of the existing transportation network to accommodate increased traffic volumes.

The rural lands of Hornsby Shire have been acknowledged in this study, other studies and in information provided to Hornsby Council by NSW Agriculture, as a valuable resource to the Sydney Region. Prior to any decision being made in respect of the future use of the subject lands, an evaluation needs to be undertaken of the impact of reducing allotment sizes upon the agricultural production rates and the rural viability of the Rural Lands. The FAB5 submission states that:

"2ha blocks in this area would not mitigate against the conduct of agriculture, would adequately protect good farmland, and provide conditions for more economically viable agriculture."

Once the effect of reducing allotment sizes upon agricultural production and returns is ascertained, policy direction rests with Council to determine whether to retain large rural land holdings, allow rural subdivision of the subject area, or provide a combination of both.

Any reduction in minimum allotment sizes could provide increased housing in the Rural Lands of Hornsby Shire. The provision of increased housing beyond the existing urban fringe of Hornsby Shire also requires policy direction from Council. An assessment needs to be made of the appropriateness of providing increased housing opportunities and encouraging population growth in the rural areas of Hornsby Shire.

Policy direction in respect of the retention of large rural land holdings and the provision of additional housing in the rural areas will be provided in Part 2 - Planning Strategy. However, prior to this decision a preliminary assessment needs to be made of the constraints and opportunities that are inherent to the area.

Evaluation

The purpose of this section is to briefly evaluate the proposal, the zoning issues and constraints to reducing the minimum allotment size for the area. The major issues to be considered in determining the future planning options for the study area are the capability of land to support reduced allotment sizes, lot size analysis, agricultural capability, infrastructure and social issues.

Natural Environment

The natural environment of the Glenorie, Fiddletown, Arcadia and Berribee area provides both opportunities and constraints for the future use of land. While the occupation of humans has altered the appearance and function of the area, the natural environment continues to influence and determine the activities carried out, and also serves to attract people and enhance the amenity of the area.

Geology and Topography: The topography of the area has resulted from the erosion of the underlying Wianamatta Group of shales and Hawkesbury Sandstone. The various geological formations that underlie the region determine the topography of the area. It may be generally stated that the Wianamatta Group is found along ridgetops and in the flatter areas while the areas of Hawkesbury Sandstone has steeper slopes. The slopes associated with the Wianamatta Group are gentle ranging from flat to 20%, whereas the slopes associated with the Hawkesbury Sandstone are more steep ranging from 10% to over 25%. It is noted that in this, and in previous studies undertaken by Hornsby Council, slopes greater than 20% are generally considered unsuitable for rural or urban development.

Fiddletown is underlain by mixed geological formations. Mittagong Formation, a mix of both shale and sandstone, is located in pockets along the ridge tops, while the adjoining areas are Hawkesbury Sandstone. Ashfield Shale underlies the areas of Arcadia that currently support activities of both a rural and rural residential nature. Adjoining these flatter more inhabited areas, is Hawkesbury Sandstone. Berribee is

entirely underlain by Hawkesbury Sandstone. Glenorie is underlain by three geological formations; Ashfield Shale in the flatter areas, Mittagong Formation on the ridge under Glenorie village and Hawkesbury Sandstone to the north of Glenorie village.

Topography generally constrains development opportunity on slopes greater than 20% due to problems that arise with site stability, erosion hazard and engineering difficulties. Accordingly, future planning controls for the area should reflect the topographical constraints.

Soil Landscapes: Soil Landscapes are areas of land that have specific and recognised topographies and soils, that can be presented on maps, and can be concisely described in statements. Chapter 4 of the Study examined the soil capability of each soil landscape found within the Study Area and established the principles that will be used in this assessment.

Glenorie, Fiddletown, Arcadia and Berribee display a mix of soil landscapes, however three soil landscapes predominate in the area, namely; Glenorie, Hawkesbury and Lucas Heights. The other less predominate soil landscapes include Gymea, Lambert and Oxford Falls.

The soils associated with the Glenorie landscape are shallow to moderately deep and occur on undulating to rolling low hills on Wianamatta Group shales. The typical limitations of these soil landscapes are high soil erosion hazard, localised impermeable highly plastic subsoil and the soils are moderately reactive.

The soils associated with the Hawkesbury soil landscape are shallow and discontinuous, occurring on rugged, rolling to very steep hills on Hawkesbury Sandstone. The typical limitations of these soil landscapes are extreme soil erosion hazard, mass movement hazard, steep slopes, rock outcrop, shallow, stony, highly permeable soils, and low fertility soils.

The soils associated with the Lucas Heights soil landscape are moderately deep and occur on gently undulating crests and ridges on plateau surfaces of the Mittagong formation. The typical limitations of these soil landscapes are stony soil, low soil fertility and low available water capacity.

Following the identification of the predominate soil landscapes, it is appropriate to determine their rural capability. Rural capability is the ability of an area of land to sustain permanent

agricultural or pastoral production without permanent damage. Rural capability is divided into three broad categories of capable of regular cultivation, capable of grazing and not capable of regular cultivation or grazing. The Glenorie landscape is considered to be capable of regular cultivation and grazing. The Hawkesbury landscape is considered to be not capable of regular cultivation or grazing. The Lucas Heights landscape is considered to be generally capable of grazing, while capability for regular cultivation should be undertaken as localised occurrences.

It may be concluded that given the soil landscapes, the majority of the area is capable of supporting some ongoing rural activities, while some parcels of land are incapable of supporting any rural activity.

Agricultural Capability: Agricultural capability is a measure of the ability of land to support permanent agriculture or pasture production without permanent damage. The Agriculture Classification by NSW Agriculture indicates 3 classes of soil within the study area; classes 3, 4 and 5. The majority of the area contains class 3 soils, with small parcels of class 4 and 5 lands. A detailed description of all soil classes is contained within Chapter 4. Lands identified as containing class 3 soils are considered a rural resource capable of being grazed and suited to pasture improvement. Class 4 lands are suitable for grazing only, while class 5 lands are unsuitable for agriculture. The classification indicates that the majority of the area under consideration is capable of sustaining agricultural use.

Flora and Fauna: The areas of Glenorie, Fiddletown, Arcadia and Berrilee contain large portions of remnant bushland that provides a habitat and corridor for fauna. The Hornsby Shire Bushland Survey (Smith and Smith) was completed in March 1990 and identified and mapped the plant communities present throughout Hornsby Shire.

The survey identified six plant communities in the Glenorie, Fiddletown, Arcadia and Berrilee area. Five of the communities identified (communities A, C, D, F and G) are associated with Hawkesbury Sandstone soils, while the remaining community (community M) is associated with the more fertile soils of the Wianamatta Shale Group. The following communities were identified:

- Community A: open-forest characterised by Eucalyptus piperita - Angophora costata;
- Community C: open-forest characterised by Eucalyptus gummifera - E. haemastoma - E. oblonga;
- Community D: woodland characterised by Eucalyptus punctata - E. gummifera - E. haemastoma;
- Community F: woodland characterised by Eucalyptus racemosa - E. gummifera - Angophora costata;
- Community G: low open-woodland characterised by Eucalyptus haemastoma - Angophora hispida - Banksia ericifolia; and
- Community M: open-forest characterised by Syncarpia glomulifera - Eucalyptus paniculata - Angophora costata.

Communities A, C, D, F and G are common species that occur either throughout the Hornsby Shire or are abundant in specific areas. However, as with other Wianamatta Shale communities, most of the original extent of Community M has been cleared. Therefore, the significant stands of remnant Community M are considered valuable and worthy of protection.

The submission by FAB5 states that:

"Vegetation existing on the majority of ridge top areas has been classified as either non-authentic regrowth, thinned or grossly disturbed vegetation or non-natural vegetation or cleared land, mainly through past agricultural practices. Natural vegetation and fauna habitats of any significance are therefore generally confined to the steeper vegetated gully and valley levels zoned as Environmental Protection. Significant remnant vegetation could be appropriately protected by regulation."

While significant parcels of land have been cleared of natural vegetation for agricultural activities and the majority of natural vegetation and fauna habitat is located on steeper non rural lands, stands of native flora that can provide habitat for fauna remain within the area.

The abundance of bushland within Glenorie, Fiddletown, Arcadia and Berrilee provides a habitat for fauna and a corridor in which fauna may move. The "Fauna Corridors and Vegetation Links in Hornsby Shire Study" undertaken by

consultants on behalf of Hornsby Council, identified the three specific fauna corridors in the

subject area (Table 12.2):

Table 12.2
Fauna Corridors - Arcadia area

Fauna Corridor	Details (land use, land tenure, zoning area)	Vegetation Communities present	Significance and Comments	Proposed Planning and Management Guidelines
Bay Rd, Berribee	Bushland in good condition separated by road. Narrow gap in corridor caused by road. Zoned Rural A. Land partly privately owned.	Open Forest and Woodland (Communities A and D).	Excellent fauna corridor link between Berowra Valley Bushland Park and Marramarra National Park bushland.	Prevent roadside clearing. Signs along road advising of corridor. Prevent clearing of private land in corridor. Considerations should be given to measures to facilitate fauna crossing road.
Arcadia Rd, Arcadia	Scattered pockets of bushland, with dwellings and rural development in between. Zoned part Rural C1, part special uses, part environmental protection B.	Open Forest and Woodland (Communities A and D).	Feasible fauna corridor link between Berowra Valley Bushland Park and Marramarra National Park bushland.	Restrict subdivisions and limit density of development. Encourage supplementary planting of habitat on road reserve and adjoining properties.
Cobah, Ridge and Perry Rds, Arcadia	Narrow band of remnant vegetation along road reservation. Substantial rural development and some dwellings. Zoned part Rural A, part environmental protection B.	Open Forest and Woodland (Communities A and D).	Reasonably narrow gap in large areas of contiguous bushland. Should be developed as a long term corridor.	Restrict subdivisions and limit density of development. Encourage supplementary planting of habitat on road reserve and adjoining properties.

(Source: Hornsby Shire Council)

There is little comprehensive information available on fauna in the study area. Given the presence of three recognised fauna corridors within the study area, fauna habitats may also exist outside the recognised bushland and environmental protection areas and on individual properties.

Lot size analysis

An analysis of allotment sizes undertaken in Chapter 5 reveal that of the 2,780 allotments in the rural part of the study area, 9% of allotments are greater than 10ha. This low figure is likely to be the result of lots being created prior to the adoption of current standards or approved as minor variations to the standard. Some 53%

(1,480 lots) of allotments within the rural areas are between 2 and 4 ha in size and have an average lot size of 2.2ha. Fiddletown, Arcadia and Berribee are located predominantly within the Calabash Creek catchment. A lot size analysis undertaken for Rural A lands south of Marramarra National Park within the Calabash Creek catchment and excluding land zoned Environmental Protection B, reveals that there are 32 lots that exceed the current minimum subdivision standard of 10ha. This analysis takes into consideration an area larger than that proposed in the FAB5 submission, which states:

"only 23 of 290 blocks comply with the zoning requirements of minimum 10 hectares

once the Environmental Protection Zone has been excised."

While it is acknowledged that many of the allotments are already below the minimum area, this does not in itself represent adequate justification to rezone the area. Such a decision should only be made having regard to a sound planning rationale and the environmental implications.

Infrastructure

Sydney Electricity and Telecom Australia currently service the subject area. Should a rezoning of the lands be undertaken to reduce the minimum allotment size, it is anticipated that any additional lots created could be adequately serviced by these authorities.

Sydney Water does provide reticulated water or sewerage services to the majority of the area. Households situated beyond Sydney Water's supply network are required to make their own water supply arrangements. Temporary (extended private) services have been connected to the water mains for a number of properties and areas within the area. These services are offered only for domestic use and are installed and maintained by property owners. Given the limited reservoir expansion capacity and topographic constraints to expanding the water supply network, Sydney Water has advised that the opportunity for further services is limited. The majority of the reticulated mains are laid to their limit and there are few opportunities for extension without the requirement for pumping stations and additional storage reservoirs.

With regard to sewerage, the subject area is located beyond the catchment of any sewerage treatment plant (STP). Alternative methods of sewerage disposal are limited given the poor soil absorption capacity, likely water quality impacts, and inefficiencies of providing a septic pump-out service to the area.

Any reduction of minimum allotment sizes and corresponding increases in population is likely to impact upon the water quality of the relevant catchments. The dominant Hawkesbury Sandstone soil landscape is shallow, stony and highly permeable and provides limited opportunity for absorption and filtering of water. Accordingly, runoff from the subject area impacts upon catchments more quickly than areas that are dominated by soils of the Wianamatta Shale Group. Given the limited opportunity to provide

adequate means of sewerage disposal, any increase in population in the subject area would have to have regard to the likely impact upon the immediate catchments and Berowra Creek.

Heritage

A heritage item may consist of a building, work, relic, place or tree which is considered to have heritage significance. It is appropriate that both Aboriginal heritage and European heritage of Glenorie, Fiddletown, Arcadia and Berrilee be considered.

Aboriginal Heritage: As discussed previously, the Aboriginal Heritage Study is currently being undertaken for the entire Shire and completion of the study is anticipated by the end of 1995. The types of items likely to be found in this area include rock carvings, camp sites or sacred areas associated with the culture of the Aboriginal peoples. It is unlikely however, that the results of the Aboriginal Heritage Study would impose significant constraints to the rezoning of the area.

European Heritage: A number of items of potential heritage significance have been identified in the area under consideration. These have been addressed in the Heritage Section of this Study and include one item from the subject area, being a grave near Bloodwood Road, Fiddletown. Three other items, currently recognised in Schedule D of the Hornsby Shire Local Environmental Plan (LEP), 1994 are located within the area. A 1940's style sandstone bungalow at 70-72 Bay Road, Berrilee is considered to be of local significance. At 58-62 Calabash Road, Arcadia on Waddell Ridge can be found the remnants of dwellings and European activities of local significance. Remnant pine trees from the 1930s at 40-44 Cobah Road, Arcadia are also considered to be of local significance. Any planning strategy developed for the area should seek to conserve these items. Similarly, any items of aboriginal heritage identified in the Aboriginal Heritage Study should also be considered for conservation in accordance with the findings of that study.

Visual Amenity

The Rural Lands have a range of visual qualities and characters ranging from the most spectacular in the State to more modest. A reduction in minimum allotment sizes and an increase in rural residential properties has the potential to alter the visual quality of the precinct. Accordingly, it is appropriate that consideration be given to the

visual quality and amenity of the Glenorie, Fiddletown, Arcadia and Berrilee area prior to any planning strategy being adopted.

The visual amenity study carried out for the Rural Lands Study recognised 9 distinct character types. The precinct contains type 1, 2, 3, 5 and 6 landscape characteristics. The Arcadia and Fiddletown area display landscape characteristic types 2, 3, 5 and 6; Berrilee and the area between Arcadia and Berrilee display only type 2 and type 5 landscape characteristics; and the eastern side of Moores Road, Glenorie displays type 1.

Type 1 classified lands, Mixed Intensive Agriculture, are the only examples in the Lower Hawkesbury Region of the particular combination of cultural elements and Glenorie Soil Landscapes and are of regional significance. To preserve this visual amenity would require the retention and maintenance of intensive horticultural and agricultural uses of the land, combined with limitations on urban features such as street frontage treatments, excessive manicured areas, clearing of row and ornamental plantings and the like.

Type 2 classified land, Mixed Agriculture and Rural Residential, is of local significance and is representative of the Hornsby area. To preserve this visual amenity would require the maintenance of agricultural uses and a rural character, while discouraging subdivision sizes and other attributes which result in residential development of an essentially urban nature.

Type 3 classified land, Orchards and Poultry Farming, is of local significance and contribute to the rural quality of the area and are becoming rare. To preserve this visual amenity would require the maintenance of agricultural uses and a rural character, while discouraging subdivision sizes and other attributes which result in residential development of an essentially urban nature.

Type 5 classified land, Active Conversion of Orchard and Poultry Farms to Hobby Farms, is characteristic of the Hornsby area and has a low visual absorption capacity and high sensitivity. To preserve this visual amenity would require the maintenance of varied and productive agricultural uses and a rural character, while discouraging any development resembling that of an urban nature.

Type 6 classified land, Rural Residential on Marginal Land, adds to the variety of visual elements in the area. To preserve this visual

amenity would require siting of residences to reduce visibility from roads, while discouraging subdivision sizes and designs which result in residential development of an essentially urban nature.

The roadways of Glenorie, Fiddletown, Arcadia and Berrilee generally follow the ridge tops. As the ridges are generally narrow and are not often confined by screening vegetation, there are many vistas and panoramic views that may be enjoyed from the roadways and adjoining lands. Views vary and are of natural features, agricultural activity and urban areas, both in the foreground and the background.

The FAB5 submission states:

"there are few if any visually prominent or scenic areas other than the general rural look that is also seen in adjoining Rural B areas.

.....the proponents contend that much of the area is typified by unkept properties and run down fencing caused by unviable agricultural activities."

The statements made in the FAB5 submission regarding the effects of rezoning on the scenic quality of the area are not consistent with the Review of the Scenic Quality of the Rural Lands of Hornsby Shire which forms Chapter 9 of the Study.

Generally, it may be said that the introduction of rural small holdings will lead to only minor variation to the visual amenity of the area. The character of rural small holdings is not considered significantly different to the existing characteristics within the subject area. It is noted however, that there will likely be a reduction in agricultural activity associated with type 1, 2, 3 and 5 landscapes. The affect of introducing an increased rural residential character to the area may lead to the loss of, or interruption of vistas, expansive views or lateral views through the insensitive location of dwellings and features associated with rural small holdings. Should Glenorie, Fiddletown, Arcadia and Berrilee be rezoned to allow rural small holdings, it would be necessary to introduce design guidelines to minimise the visual impacts of such development.

Transport Services

As discussed in Chapter 8, the capacity of transport services to accommodate higher density

development influences decision making. The FAB5 submission suggests that should the minimum allotment size be reduced to 2ha, approximately 230 new allotments would be created. This increase would, on average, lead to an increase of approximately 2,000 vehicle movements within the northern rural area. The submission bases its assumptions for traffic growth on figures from the RTA obtained in 1989 and 1991.

The subject area is served entirely by road in respect of transport. The capacity of transport infrastructure in the area must be taken into consideration in any planning strategy. Accordingly, both public and private transport should be considered.

Public Transport: At present, public transport is generally limited to bus services for school children in peak periods. Due to the dispersed nature of residences within the area and its inherent topographical constraints, public transport services are likely to remain at their present level. It is likely that demand for public transport would increase with additional school age children using the school bus service.

Traffic: The principal mode of transport in the rural lands is the motor vehicle, with modest public transport support. The main thoroughfare through the subject area is a former main road connecting the Berowra Waters Ferry with Galston Village. This road is both narrow and circuitous, winding down from Galston through Berrilee to Berowra Waters.

Due to the dispersed nature of residences and the broad area under consideration, the anticipated increase in development densities resulting from a reduction in the minimum allotment size is not likely to result in substantial increases in traffic volumes within individual road catchments. However, the overall net impact of in excess of 2,000 additional car movements at focal points such as Galston will lead to higher volumes utilising and impacting upon the existing arterial road network during peak periods. However, until such time as there is a clear indication of the potential number of lots likely to result from any rezoning proposal, the capacity of the road system and necessary public transport and traffic system improvements to support additional traffic cannot be accurately determined.

Summary

Much of the subject area is capable of sustaining rural pursuits, despite portions of the area being significantly constrained by features of the natural environment. Opportunity to reduce minimum allotment sizes in the area and thereby increase population densities is significantly constrained given the restricted opportunities for the provision of water and the inability to adequately dispose of sewerage while protecting catchments from increased pollution.

The constraints imposed by the natural environment are limiting, however the provision of water and disposal of sewage represent prohibiting factors given their environmental and economic costs.

In the event that the Planning strategy for the rural lands adopt a policy of reducing minimum allotment sizes to encourage rural-residential development, investigation will need to be undertaken in respect of providing adequate water and sewerage services to Glenorie, Fiddletown, Arcadia and Berrilee. To ensure equity, services should be provided to all areas identified for rural residential subdivision, rather than to only those areas that have been identified in submissions to Council.

Concurrently with any investigation undertaken in respect of sewerage, assessment should be made of the environmental impacts associated with increased housing and population densities.

It is recommended that until such time as Hornsby Council seeks to encourage rural residential development and is certain adequate environmentally sound servicing can be provided to the subject area, a "precautionary" approach be adopted to reducing minimum allotment sizes, and the maintenance of the lands in their current state be encouraged.

12.3 Land in the vicinity of the intersection of Mid-Dural and Galston Roads

The precinct located on the south-west corner of the intersection of Galston and Mid-Dural Roads is also the subject of a rezoning submission to Council (Figure 12.1). The submission proposes the rezoning from Rural B to Rural Residential to permit the subdivision of allotments of 4,000m². The precinct is located within the Colah Creek/Marramarra Creek Catchment, has an area of 23.7 hectares and contains 14 allotments in the precinct, ranging in size from 4,987m² to 2.7 hectares with the average allotment size being 1.69 hectares. The minimum standard for the

Rural B zone is 2 hectares. A rezoning permitting subdivision into 4,000m² allotments would provide the potential for an additional 36 allotments in the precinct.

Background

The rezoning submission for the precinct has been submitted on behalf of 10 property owners who own 11 of the properties in the precinct. The remaining 3 allotments which range in size from 4,987m² to 6,178m², have been excluded from the rezoning request. This is because these lots would not have the potential for further subdivision under the proposed 4,000m² standard. However, for the purposes of this assessment, it is appropriate that these allotments be included, as they form part of the precinct. The rezoning proposal submitted to Council for the precinct addressed the agricultural viability of the land, water and sewerage, visual amenity, traffic, infrastructure and economic issues.

Planning Context

The zoning of land in NSW is regulated by the Environmental Planning and Assessment Act, 1979, and undertaken by local Councils. Under the Act, Councils are required to consider zoning of land within a strategic planning context. In this respect there are 2 levels of strategic assessment that need to be considered in an evaluation of whether or not to rezone land. These levels are complementary and can be considered to be macro and micro levels. Macro level issues provide a broad perspective of local and regional strategic issues. Micro issues relate to the capability of the land to accommodate development within the environmental servicing constraints of the natural environment and infrastructure. Accordingly, the following discussion will consider the macro planning issues followed by an integrated assessment at both levels.

Relevant considerations at the macro level include local and regional housing needs, strategic planning options for the future form of the Galston Village Area, and the retention of agricultural land in the Sydney Metropolitan Area. An understanding of the macro issues provides a framework for the evaluation of the micro issues of the natural environment, visual amenity, traffic and heritage.

Regional Housing Needs: The Department of Planning's publications "Sydney into its Third Century" and "Cities into the 21st Century"

provides a policy framework within which major government agencies could make decisions, allocate resources and co-ordinate their activities. Under the strategies, large sections of the study area are identified as being subject to primary constraints to urban development, including prime agricultural lands, steep terrain, distinctive scenic areas, and Marramarra National Park. The area between Dural and Galston is identified as not being subject to these primary constraints. Nevertheless, the study area is not identified as an area for future urban development, with a preference for the areas of Rouse Hill, Marsden Park, Londonderry, Bringelly and Macarthur South. These release areas are forecasted to meet Sydney's housing needs for the next 15 years. Accordingly, there is not a regional role in relation to regional planning objectives for more intense residential or rural residential development within the Galston area.

Local Housing Needs: Without the influence of broader regional demand, local housing needs within the Study Area will be principally determined by the population profile within the study area. In this respect Chapter 10 - Community Profile and Resources, demonstrated a need for housing alternatives suited to the older and younger age categories within the 20 year time frame of this study. Accordingly, the planning strategy for the study area needs to provide housing options which can satisfy the needs of these age groups.

In this context, the report has not identified a demand for rural residential development like that proposed in the rezoning submission for the precinct. However, it is noted that the submission also recommended that the site could be adapted for retirement style housing. Therefore, the planning strategy should consider the suitability of the subject site for this use. These type of housing possibilities would best be achieved through a low density residential zoning, which would permit subdivision into residential allotments. Consequently, the following assessment will need to evaluate the capability of the precinct to accommodate residential development.

The results of this assessment will either discount the land from consideration or provide the framework for a strategic decision to be made as to whether it is appropriate to rezone the land. Should it be determined that part of the land could support residential development then an assessment of whether or not to rezone the land will need to be made as part of the planning

strategy for the Galston Village area. The strategic assessment will need to consider the extent of rezonings required to meet local housing needs, the long term planning options for Galston and the constraints that apply to the land within the precinct in comparison to other lands within the village.

Agricultural Production: As noted in Chapter 6 - Economic Environment, an Agricultural Production Survey of the study area was undertaken by NSW Agriculture. The survey valued agricultural production in the study area at \$98 million and established that it is essential to the regional and National economies that viable agricultural lands be preserved. Accordingly, it is appropriate that the agricultural capability of the subject lands in actual and potential terms be evaluated. This will be undertaken in the following micro level assessment of the site's natural environmental capabilities.

Infrastructural Resources: In assessing the rezoning submission it is necessary to consider the availability of services to the precinct and the affect providing services would have on infrastructural resources in the wider supply area. The precinct is capable of being serviced by electricity, telecommunications and waste collection services.

As discussed in Chapter 7 - Infrastructure, Sydney Water has advised that its current reservoirs and pumping stations only have the capacity to service a further 1000 dwelling equivalents within the study area and Baulkham Hills Shire, without significant augmentation. The limited availability of reticulated water services restricts the potential for rural residential style development within the precinct.

In this respect, the precinct is located in proximity to the major water mains on Galston Road and a residential zoning of land within the precinct would be contiguous with the aim of maximising remaining water supply infrastructure.

The precinct is not serviced by a reticulated sewage system. As a general principle, small lot residential subdivision should not be permitted in locations not serviced by a reticulated effluent disposal system. Consequently, effluent would be required to be disposed on-site or collected and removed off-site via a pump-out service.

As discussed in Chapter 7 - Infrastructure, there are various problems associated with the alternate disposal options. In relation to Domestic Sewage

Treatment Plants (DSTP's) and septic systems, these principally relate to contamination and water quality impacts. The planning report noted that these impacts are most extreme in shallow sandy soils associated with the Hawkesbury Sandstone geology where soil absorption is minimal. Where soil landscapes are found to be unsuitable for these types of disposal systems, developments are required to use a commercial tanker pump-out service.

It may be concluded that the necessary infrastructure services to permit Rural Residential Development within the precinct can be provided. However, appropriate type of waste water and effluent disposal means would need to be determined through detailed assessments of the soil depths and absorption capacities. The absorption capacity of soils within the subject lands, in comparison to other lands is a factor that should be considered in the planning strategy if it is determined to rezone land to permit additional residential development within the Galston Village area.

Natural Environment

Topography: The majority of land in the precinct has a slope below 20%, although the south western corner of the precinct has slopes greater than 20%. This corner is associated with bushland areas that are adjacent to Colah Creek. The Natural Environment section of the report has already noted that slopes greater than 20% are unsuitable for residential development due to erosion and sediment control issues.

Soil landscapes: Three soil landscape units occur within the precinct, namely Glenorie, Lucas Heights and Gymea Soil Landscapes.

The Glenorie Soil Landscape is the dominant soil landscape and occurs on approximately 65% of the precinct. The soils range from shallow to moderately deep with typical limitations including high erosion hazard, localised impermeable highly plastic subsoil and moderate reactivity.

The Lucas Heights Soil landscape occurs on approximately 25% of the precinct in the south and west of the precinct. The soils are moderately deep and with limitations, including stony soil, low fertility and low available water capacity.

The remaining 10% of the precinct comprises the Gymea soil landscape. This landscape is associated with the natural bushland area in the

south western corner of the site on the steeper lands adjacent to Colah Creek. The soils are shallow to moderately deep with typical limitations, including steep slopes, high soil erosion hazard, rock outcrops, shallow highly permeable soil, and very low soil fertility.

The urban capability criteria provides a relevant measure of the land's potential to support residential development. Specifically, urban capability is the potential of land to support a particular intensity of urban development without serious erosion and sedimentation occurring during construction, as well as possible instability and drainage problems in the long term (Houghton and Charman, 1986).

The Soil Conservation Service (SCS) has classified the soil landscapes into three broad categories of those considered of high capability for urban development; of low to moderate capability for urban development; and not capable for urban development. Rural capability is the ability of an area of land to sustain permanent agricultural or pastoral production without permanent damage.

The Glenorie soil landscape which is predominant in the precinct is considered to be of low to moderate capability for urban development. Land containing this soil landscape is generally capable of being grazed or regularly cultivated. The Lucas Heights landscape is identified as being of high capability for urban development

while also being capable of supporting grazing with some localised areas capable of regular cultivation. The Gymea landscape is considered to be of low to moderate capability for urban development and is not considered to be suitable for grazing or cultivation.

The capability recommendations are made by the Soil Conservation Service for regional planning purposes and are summarised in table 12.3.

From the above analysis it is apparent that the precinct contains a diversity of soil landscapes with varying degrees of urban and agricultural capability. It may be concluded that approximately 25% of the precinct in the Lucas Heights Soil Landscape could readily accommodate increased residential development. The analysis also indicates that 90% of the precinct has the potential to support some grazing and regular cultivation. In this respect, it is necessary to have a more detailed understanding of the lands' capability. This can be achieved by further assessing the agricultural capability of the precinct.

Agricultural capability: Agricultural capability is a measure of the ability of land to support permanent agricultural or pasture production without permanent damage. The agriculture classification by NSW Agriculture indicates three classes of land within the precinct, being Classes 2, 3 and 5.

Table 12.3
Summary of Soil Landscapes - Mid Dural and Galston Roads

Soil Landscape	Slope	Mass movement hazard	Surface movement potential	Erosion hazard (subsoil-topsoil loss)	Urban capability	Rural capability
Glenorie	Undulating to rolling	Low	Moderate	Moderate to high (65 - 117t/ha)	Low to moderate	Generally capable of being grazed and regularly cultivated.
Gymea	Undulating	Low	Low	High to extreme (19 - 464t/ha)	Low to moderate	Not considered capable of being grazed or cultivated.
Lucas Heights	Gentle	Low	Low	Moderate to high (103 - 97t/ha)	High	Capable of supporting grazing with some localised areas capable of regular cultivation.

The majority of land within the precinct are class 3 lands occupying three quarters of the site. A wedge of Class 5 land occurs in the south western corner of the site on the steeper vegetated lands adjacent to Colah Creek. A negligible encroachment of Class 2 lands occurs in the north eastern corner of the site.

Under the classification system, lands identified as Class 3 are assessed as being suitable for grazing, pasture improvement or crops. Alternatively, Class 5 land is unsuitable for any agricultural activities.

In this respect, it can be concluded that approximately 75% of the precinct is suitable for agricultural activities. Site surveys indicate that approximately 33% of the precinct is presently being used for some type of crop, mainly stone fruit. As noted previously, preservation of agriculturally productive land in both the Shire and the Sydney Region is an important planning consideration. In this respect, residential development within the precinct would erode this viability. Therefore, any planning strategy for the Galston Village should aim to preserve the agricultural potential of these lands.

Flora and Fauna: Native flora is limited to the south and western portions of the precinct as a consequence of past clearing for agricultural activities. The area has been classified in bushland surveys as tall open forest, with the dominant tree species being *Eucalyptus pilularis*, *Angophora costata* and *Syncarpia glomulifera*.

The following comments are made in regard to plant community L, in the Hornsby Shire Bushland Survey (Smith & Smith, 1990).

Community L is associated mainly with gullies, has been less affected by clearing and is now the most extensive of the taller forest communities in the Shire the largest areas of this community are outside the major reserves, with a total of 765ha mapped during this survey.

Chapter 4 - Natural Environment did not nominate community L as being in serious need of conservation measures, based on its distribution throughout the Shire. The extensive distribution of this forest type reflects its occurrence on land with Class 5 agricultural classification, Gymea Soil Landscape (which is not suited to residential or agricultural uses) and portions of land with slopes in excess of 20%.

The rezoning submission did not include a flora or fauna study. Notwithstanding, the bushland areas serve as a buffer area to Colah Creek and in conjunction with the abovementioned constraints should not be considered for rezoning.

Visual amenity

Located on the southern side of Mid-Dural Road opposite the Galston Village, views of the site from the village and Mid-Dural Road are reasonably obscured by an elevated verge fronting Mid-Dural Road and its south westerly slope. However, the site is highly visible while travelling north or south along Galston Road.

The scenic quality assessment in Chapter 9 recognised 9 distinct landscape character types. The precinct was identified as comprising a landscape character Type 1 - Mixed Intensive Agriculture which is of regional significance. Type 1 landscapes are associated with the Glenorie Soil Landscape and are subject to intensive cultivation.

The precinct has been identified as having a low visual capacity to absorb residential development. Conversely, a high visual amenity rating is given for continued agricultural use of the land and related residential use of similar form and scale.

It should be noted that the visual amenity study provided the following recommendation in terms of ensuring the future amenity of the Galston Village:

"If the village is to expand, the direction with the least visual impact implications is to the north west generally (towards Sallaway and School Roads) where it would expand into similar landscape and landform to the main part of the existing village."

Consequently, in any strategic assessment of the suitability of the land for a residential zoning, consideration should be given to this recommendation. Such an assessment will need to weigh this issue against the other constraints identified in the precinct and on other lands surrounding the existing village area.

Traffic

A rural residential rezoning to permit subdivision of lots to 4,000m² would provide the potential for a maximum of 36 additional allotments. Galston and Mid-Dural Roads currently function at the highest level of service and would not be

overburdened by rural residential development of this scope, although increased traffic would have implications, albeit minor, on the arterial road network. A strategy to limit the number of access points would be required in the event the land was rezoned.

Heritage

The precinct does not contain any European heritage sites listed within the HSLEP. No aboriginal archaeological survey has been undertaken as part of this assessment. Sites of aboriginal occupation may occur in the undisturbed parts of the precinct and along Colah Creek.

Summary

This section of the report has provided an analysis of the capability of the precinct in the vicinity of the intersection of Mid-Dural and Galston Roads to support increased rural/residential densities.

The precinct has been assessed within a framework including macro and micro strategic issues. In this planning context, the assessment has found that more intense rural residential development within the precinct could not be supported by any planning rationale. However, on the basis of the findings from the planning report a need to provide housing alternatives for older and younger age groups has been identified. The provision of these housing options will be addressed as part of the planning strategy for the study area.

Should it be determined as part of the strategy that rural zoned land within the Galston area is required to provide these housing options, then consideration should be given to this precinct. In this respect, the evaluation of the natural environmental and servicing capabilities provides constraints and opportunities for the land to accommodate a rural/residential zoning. In the preparation of any planning strategy these constraints will need to be balanced against those of other potential land within the vicinity of the Galston Village area.

12.4 The Monastery Site

The Benedictine Monastery is located on the corner of Arcadia and Fagans Roads, Arcadia and is known as Nos.113-121 Arcadia Road, Arcadia. The site consists of four allotments which have a combined area of 33.9 hectares and is zoned Rural B, except for 200m² zoned Environmental

Protection B (River Catchment). The site has been the subject of two Development Applications in 1981 and 1993, proposing the subdivision of the site into 11 and 13 allotments, respectively. The more recent application was approved in 1994.

The owners of the Benedictine Monastery have advised that they sought approval of the Development Application to protect the value of the property although they are unlikely to proceed with the subdivision. During the assessment of the recent Development Application, Council received submissions suggesting that the Environmental Protection zone should be reviewed and the subdivision of the land based on the minimum allotment size of 2ha was not appropriate. It was suggested that an alternative subdivision approach, which achieved the same number of allotments but had a better regard to the visual, agricultural production and natural environment values of the site should be considered. Consequently, Council resolved to approve the application and to consider the site specifically in the Rural Lands Study, and thereby determine the opportunities and constraints for the future development of the site.

Planning Context

The subject site is located at the fringe of the Rural B zoned lands within close proximity of the Rural A lands. Any strategy developed should be based on both the broad planning context and the specific issues of the site.

The site is in close proximity to Arcadia Public School and the 4ha of residentially zoned lands at the intersection of Arcadia Road and Blacks Road. Accordingly, opportunity is available to increase the area of residential land within Arcadia. However, as discussed previously, proximity to urban land does not represent adequate justification to pursue the conversion of rural land to urban land.

Policy direction in respect of, population of the rural lands, acceptable densities, size of rural land holdings and rural residential development of the Rural Lands will be provided in Part 2 - Planning Strategy. Prior to this direction, consideration needs to be given to the issues of infrastructure, the constraints and opportunities provided by the natural environment, and the capacity of the existing transportation network.

Evaluation

The purpose of this section is to briefly evaluate the opportunities and constraints for the future development of the subject site. The major issues to be considered in determining the future planning options for the site are the constraints imposed by the natural environment, agricultural capability and infrastructure.

Natural Environment

The natural environment of the subject site is varied in character. Portions of the site appear to remain as undisturbed bushland, whilst large areas of the site have been cleared for agricultural and religious pursuits. The natural environment will continue to influence and determine the activities undertaken on the site.

Geology and Topography: The subject site is underlain by Ashfield Shale of the Wianamatta Group and Hawkesbury Sandstone. The underlying geological formations determine the topography, and influences the soils, of the site. The subject site forms a knoll in the area. The highest point has an elevation of 216m, while the lowest 186m above sea level. The site is predominantly undulating and records a 6% slope at the steepest section. The topography of the site does not represent a prohibiting constraint to further development.

Soil Landscapes: The site contains both the Glenorie and Gymea soil landscapes. The predominant soil landscape is Glenorie, the extent of the Gymea soil landscape can only be determined by specific examination of the site. The soils associated with the Glenorie landscape are shallow to moderately deep and occur on undulating to rolling low hills on Wianamatta Group shales. The typical limitations of these soil landscapes are high soil erosion hazard, localised impermeable highly plastic subsoil and the soils are moderately reactive.

The soils associated with the Gymea soil landscapes are shallow to moderately deep and are characterised by undulating to rolling rises and low hills on Hawkesbury sandstone. The typical limitations of these soil landscapes are localised steep slopes, high soil erosion hazard, rock outcrop, shallow highly permeable soil, and very low soil fertility.

Following the identification of the prominent soil landscapes of the subject site, it is appropriate that their capability for urban and rural development be determined. The predominant Glenorie soil landscape is considered to have a low to moderate

capability for urban development and is generally capable of being grazed and regularly cultivated. The Gymea landscape is considered to be of low to moderate capability for urban development and lands containing this soil landscape are not considered capable of being grazed or cultivated.

Agricultural Capability: Agricultural capability is a measure of the ability of land to support permanent agriculture or pasture production without permanent damage. The Agriculture Classification by NSW Agriculture indicates that the subject site contains classes 3 and 5. The site is predominantly class 3 with two small sections of class 5 in the mid northern and north eastern area of the site. Class 3 soils are considered a rural resource capable of being grazed and suited to pasture improvement. Class 5 lands are unsuitable for agriculture. The classification indicates that the majority of the site is capable of sustaining agriculture.

Flora and Fauna: The Hornsby Shire Bushland Survey (Smith and Smith) was completed in March, 1990 and identified and mapped the plant communities present throughout Hornsby Shire. The survey identified 3 communities (communities A, D and M) within and adjacent the subject site. Community M is the predominant community, while communities A and D occupy very small areas in the north east of the site. Communities A and D are associated with Hawkesbury Sandstone soils, while community M is associated with the more fertile soils of the Wianamatta Shale Group. The following communities were identified:

Community A:	open-forest characterised by <u>Eucalyptus piperita</u> - <u>Angophora costata</u> ;
Community D:	woodland characterised by <u>Eucalyptus punctata</u> - <u>E. gunnii</u> - <u>E. haemastoma</u> ;
Community M:	open-forest characterised by <u>Symplocarpus glomulifera</u> - <u>Eucalyptus paniculata</u> - <u>Angophora costata</u> .

Communities A and D occur throughout the rural area and Hornsby Shire and are not in areas of specific protection. However, as with other Wianamatta Shale communities, most of the original extent of Community M has been cleared. Therefore, significant stands of remnant

Community M are considered valuable and worthy of protection.

The development application submitted in 1993 was accompanied by a fauna report that included information on flora of the site entitled "Fauna Survey and Assessment of Endangered Fauna Requirements". The report identified 4 fauna habitats; "grassland", "white stringybark - turpentine open forest", "narrow-leaved ironbark - white ironbark open forest" and the "dam". The white stringybark - turpentine open forest occurs in the north eastern portion of the site and aligns with Community M. The narrow-leaved ironbark - white ironbark open forest occurs centrally within the site and forms a east - west corridor. A consultant engaged by Council to review the fauna submission for the subdivision proposal has found that the vegetation and wildlife habitats of the study area are consistent with the description prepared by the applicant's consultant. Further, inspections of the site did not reveal any rare or endangered plants included on Schedule 12 (Protected Native Plants) - National Parks and Wildlife Act, 1974. However, Council's consultant found that the presence of the plateau open forest community in a relatively undisturbed condition in the north-east corner of the site is significant. Regionally, this community has been extensively cleared from this soil landscape group for cultivation or pasture. The mature forest in the north east corner of the site appears to have the characteristics of the original vegetation of the area as evidenced by the wide range of tree age classes represented on the site. It is recommended that the vegetation be recognised by designating the land Bushland Protection in

accordance with Clause 19 of the Hornsby Shire LEP, 1994.

The study, "Fauna Corridors and Vegetation Links in Hornsby Shire" undertaken by consultants on behalf of Hornsby Council, identified Arcadia Road, Arcadia as a fauna corridor, as summarised in Table 12.X.

The stand of vegetation in the north eastern portion of the subject site provides a bushland linkage from the site to the large areas of bushland around Calabash Creek gully to the north and north east of the site. This stand of flora is considered a fauna habitat and is likely to act as a fauna corridor from and to the site. The Bushland and Fauna Habitat maps prepared for the "Fauna Corridors and Vegetation Links in Hornsby Shire" study indicate other parcels of bushland on the site that have not been nominated as a plant community. This representation on the map aligns with the fauna report prepared for the 1993 Development Application for subdivision of the site and has been nominated in that report as "narrow-leaved ironbark - white ironbark open forest". The white ironbark open forest may also provide a suitable habitat for fauna and a fauna corridor through the site. This vegetation was not included in the proposed 1993 subdivision area and accordingly was to be retained. It is considered appropriate that prior to any impact upon this vegetation being consented to by Council, a comprehensive examination be undertaken of all the vegetation on the site, its value as a fauna corridor be assessed, and the potential impact of any development be assessed.

Table 12.X
Fauna corridor - Monastery site

Fauna Corridor	Details (land use, land tenure, zoning area)	Vegetation Communities present	Significance and Comments	Proposed Planning and Management Guidelines
Arcadia Rd, Arcadia	Scattered pockets of bushland, with dwellings and rural development in between. Zoned part Rural A1, part special uses A, part environmental protection B.	Open Forest and Woodland (Communities A and D).	Feasible fauna corridor link between Berowra Valley Bushland Park and Marramarra National Park bushland.	Restrict subdivisions and limit density of development. Encourage supplementary planting of habitat on road reserve and adjoining properties.

Source: Land and Environment Planning 1994

It is considered that portions of the subject site contain significant vegetation that warrants protection. Arcadia Road, Arcadia is recognised as a fauna and transport corridor and may be supported by flora on the subject site. Any proposed development of the subject site should take into consideration the impact upon the vegetation of the site and its role as a habitat and bushland corridor for fauna. The vegetation of the site divides the site into two portions of developable land separated by vegetation.

Visual Amenity

Prior to any planning strategy being adopted it is appropriate that consideration be given to the existing visual quality and amenity of the site. The visual amenity study carried out for the Rural Lands Study recognised 9 distinct character types. The site contains type 2 landscape characteristics.

Type 2 classified land, Mixed Agriculture and Rural Residential, is of local significance and is representative of the Hornsby area. To preserve this visual amenity would require the maintenance of agricultural uses and a rural character, while discouraging subdivision sizes and other attributes which result in residential development of an essentially urban nature.

The roads of Arcadia generally follow the ridgelines. As the ridges are generally narrow and are not often confined by screening vegetation, there are many vistas and panoramic views that may be enjoyed from the roadways and adjoining lands. An expansive view or panorama exists from the western side of Fagans Road, opposite the Monastery site, to the west. No other specifically identified views, vistas or panoramas exist in the immediate vicinity of the Monastery site.

The introduction of rural small holdings will lead to only a minor variation to the visual amenity of the area. The approved subdivision of the subject site will therefore not alter the visual amenity significantly.

Infrastructure

Sydney Electricity and Telecom Australia currently service the subject site, it is anticipated that any additional lots to be created in the future could be adequately serviced by these authorities.

Sydney Water provide reticulated water services to the site. However, the site is located beyond

the catchment of any sewerage treatment plant (STP), and it is anticipated that reticulated sewerage will not become available to the site.

The subject site drains to two catchments, Calabash Creek and Colah Creek. Concern has been expressed by Council relating to nutrients, including phosphates and nitrates contained in effluent and the potential for run-off to stormwater systems and natural watercourses. In determining the subdivision application for the site, Council conditioned that details be prepared by a suitably qualified environmental consultant confirming the capability of the site to receive effluent waters;

"Such detail must include testing for the capability of the site to absorb effluent without seepage, percolation or run-off to adjacent stormwater systems and sub-soil water tables. Similarly, should effluent disposal be proposed by spray irrigation from domestic sewer treatment plant installations, then detail prepared by a suitably qualified environmental consultant showing the capability of the soil to receive effluent waters without seepage, percolation or run-off to adjoining stormwater systems and sub-soil water tables is to be provided."

Any development of the site is likely to impact upon the water quality of the relevant catchments. The extent of this impact should be determined prior to any strategy being developed for the site.

Heritage

The Aboriginal Heritage Study is currently being undertaken for the entire Shire and completion of the Study is anticipated by the end of 1995. The types of items that may be found in this area include rock carvings, camp sites, or sacred areas associated with the culture of the Aboriginal peoples. It is unlikely however, that the results of the Aboriginal Heritage Study would impose significant constraints to the future activities undertaken on the site. No items of European heritage have been identified on the site.

Transport Services

The subject site is served entirely by road in respect of transport. The capacity of the existing infrastructure must be taken into consideration in any planning strategy. Public transport is currently limited to bus services for school children in peak periods. The principal mode of

transport to the site is the motor vehicle. The capacity of the road system is considered capable of containing any development that may occur on the subject site. Any development would however require the construction of pavement in Fagans Road from the end of the existing pavement. The extent of the pavement and its alignment would be dependent upon the extent of the development and the impact upon adjoining vegetation. Until such time as there is a clear indication of proposed development for the subject site, the necessary road improvements cannot be accurately determined.

Subdivision options

Having considered the opportunities and constraints for future development of the site, an evaluation of the subdivision pattern can be considered. The approved 13 lot subdivision pattern was established on the basis of a 2ha minimum allotment size. The subdivision resulted in 12 lots of 2ha and a residue lot of 9.9ha containing the monastery, bushland and the dam. A number of alternative means of subdivision control can be considered, namely:

- * average allotment size;
- * performance controls;
- * concessional lots;
- * concessional lots without dwelling rights;
- * community title with farmhouse allotments;
- * cluster housing; and
- * dual occupancy.

Appendix K provides a summary of the advantages and disadvantages of each option for subdivision control in the rural areas. Of these options, the one providing greater certainty and ease of administration is the minimum allotment size. While the minimum allotment size fails to provide for a more flexible approach, it provides the greatest certainty to property owners and the broader community, along with a greater ease of administration. Accordingly, it is recommended that a minimum allotment size criteria be retained.

Summary

The subject site is capable of supporting rural activities, despite some portions being constrained by features of the natural environment. The flora of the site is mixed in character, however areas of significant vegetation worthy of retention exist. A fauna corridor is recognised adjacent the site on Arcadia Road and is likely to exist through the site and in the north eastern corner of the site.

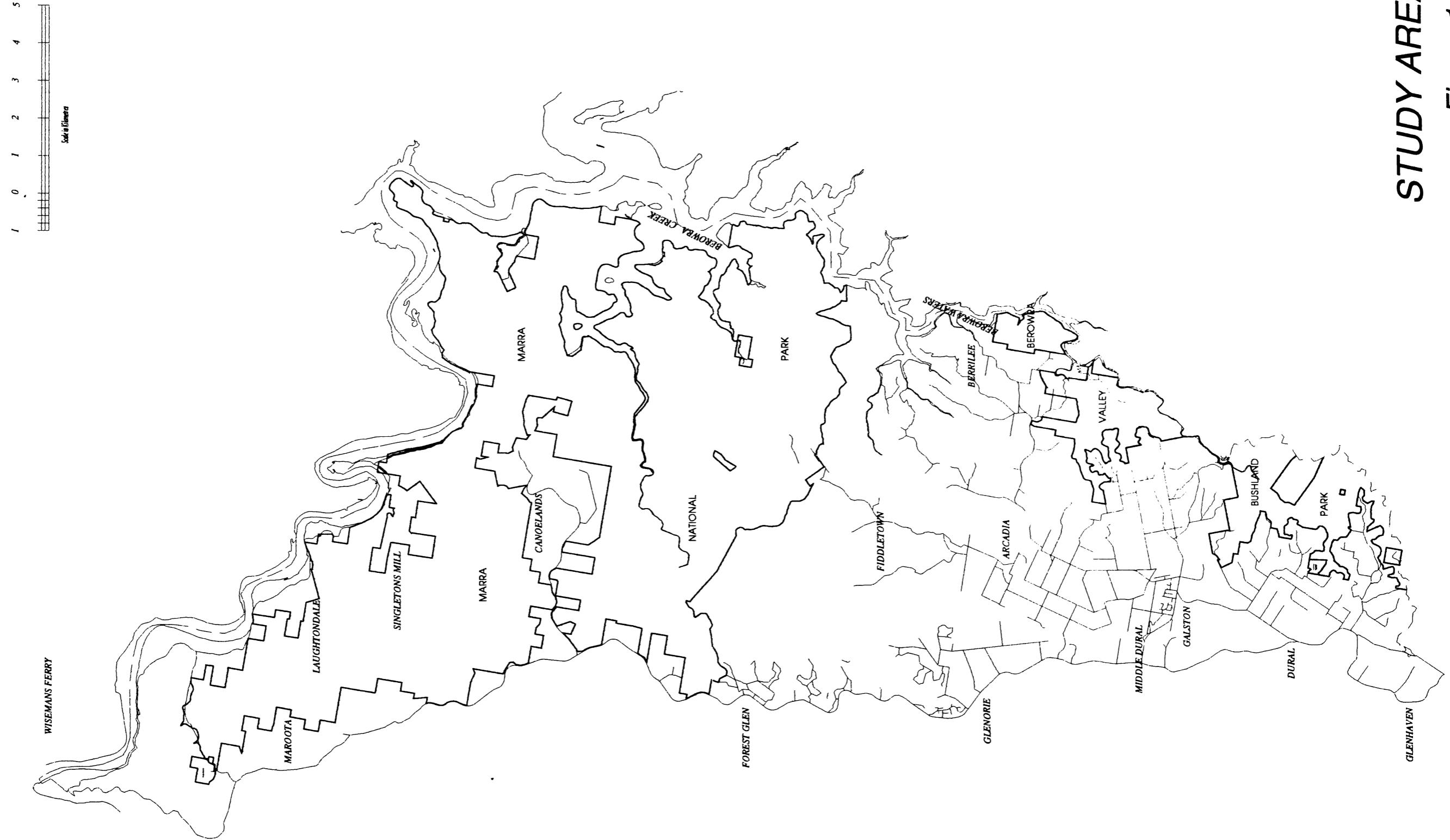
The extent of these corridors have not been determined and need clarification prior to any planning strategy being adopted for the site. The features of the natural environment that impose constraint to development are located centrally and in the north eastern portion of the site. These features effectively divide the subject site into two. Accordingly, should Part 2 of the study adopt a strategy of expanding the adjacent residential area, it is considered inappropriate to develop the areas of the site alienated by the vegetation and fauna corridor to the west and north west.

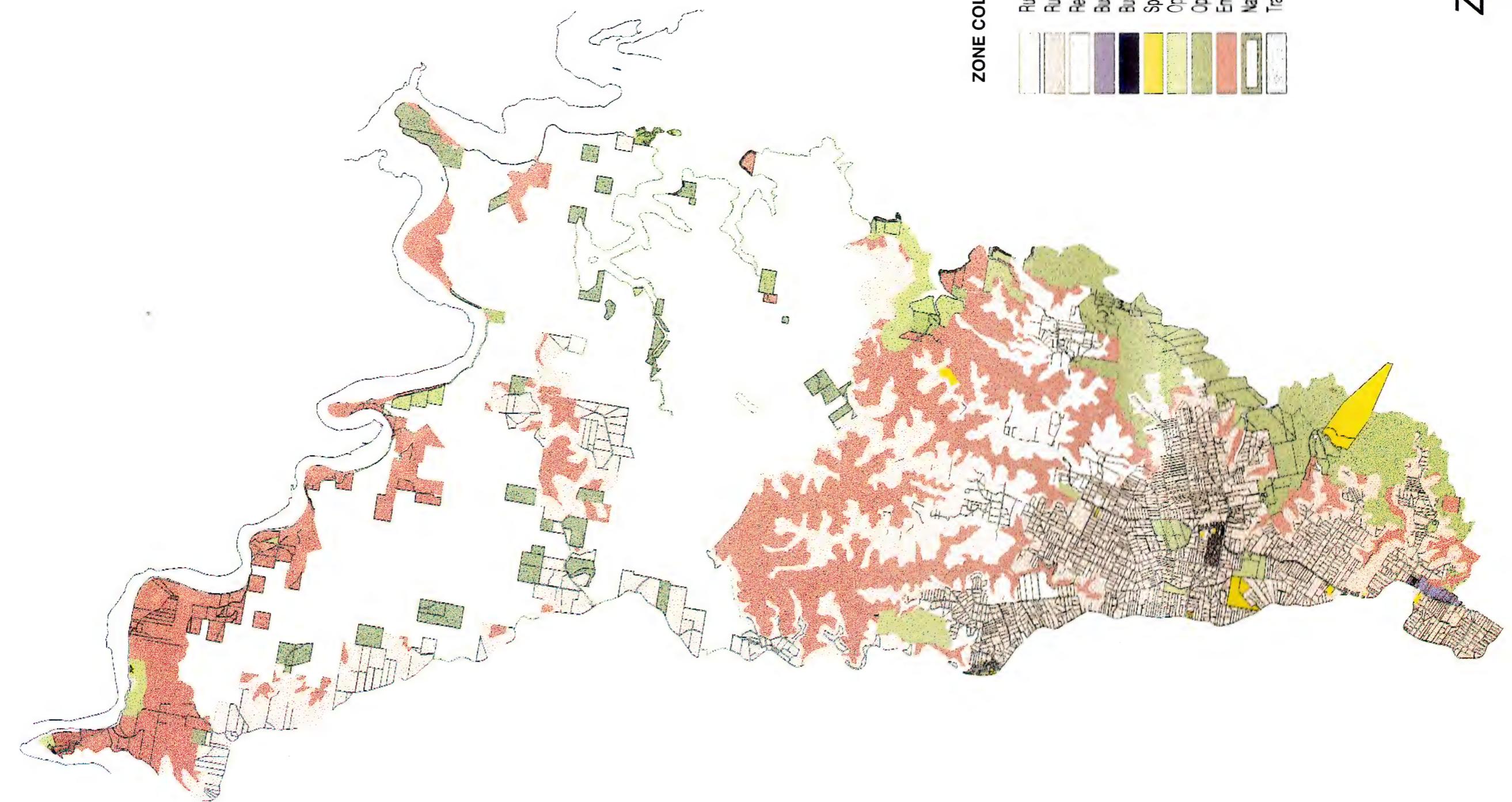
The disposal of sewerage represents a prohibiting factor until the impact upon the environment of domestic sewerage treatment is known. An assessment needs to be made of the capability of the site to receive effluent waters without impacting upon the immediate environment and surrounding catchments.

It is recommended that unless a strategy of increasing population densities in the area is adopted by Hornsby Council, the existing 2Ha subdivision standard be maintained to encourage agricultural pursuits. Further, that areas of land containing significant stands of vegetation be recognised by placing a bushland protection overlay in accordance with Clause 19 of the Hornsby Shire Local Environmental Plan, 1994.



STUDY AREA
Figure 1.2





ZONING
Figure 2.1



Scale in Kilometres
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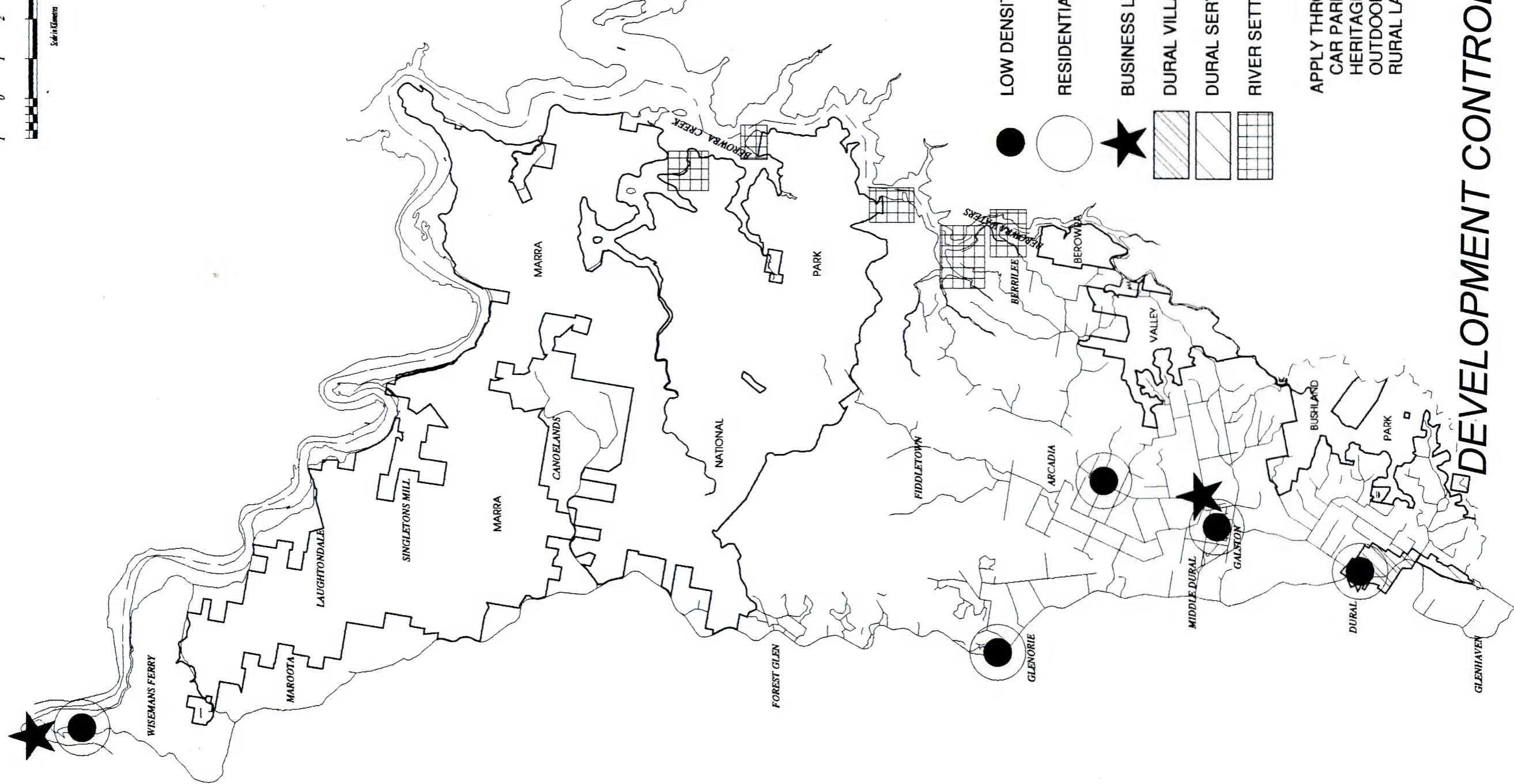
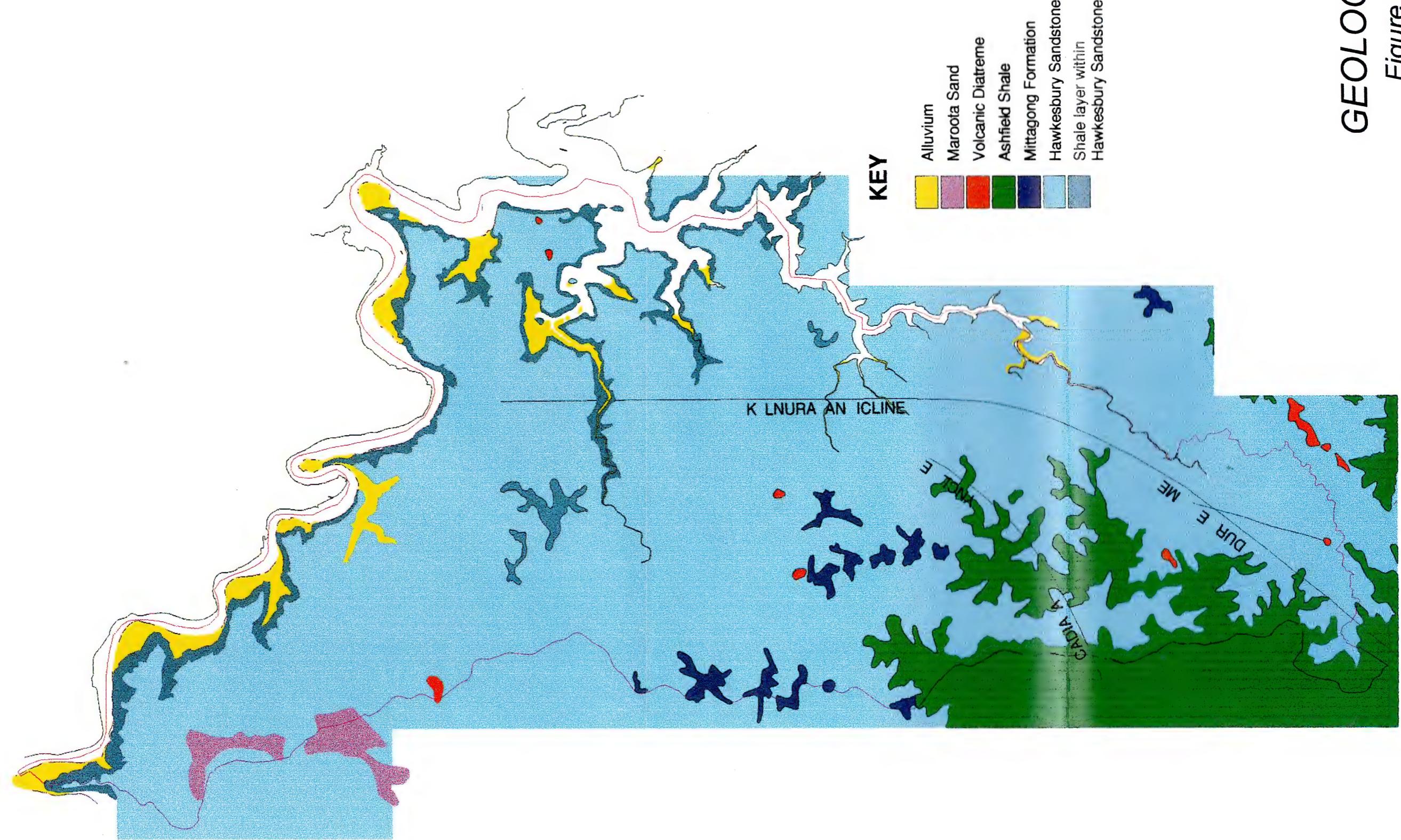


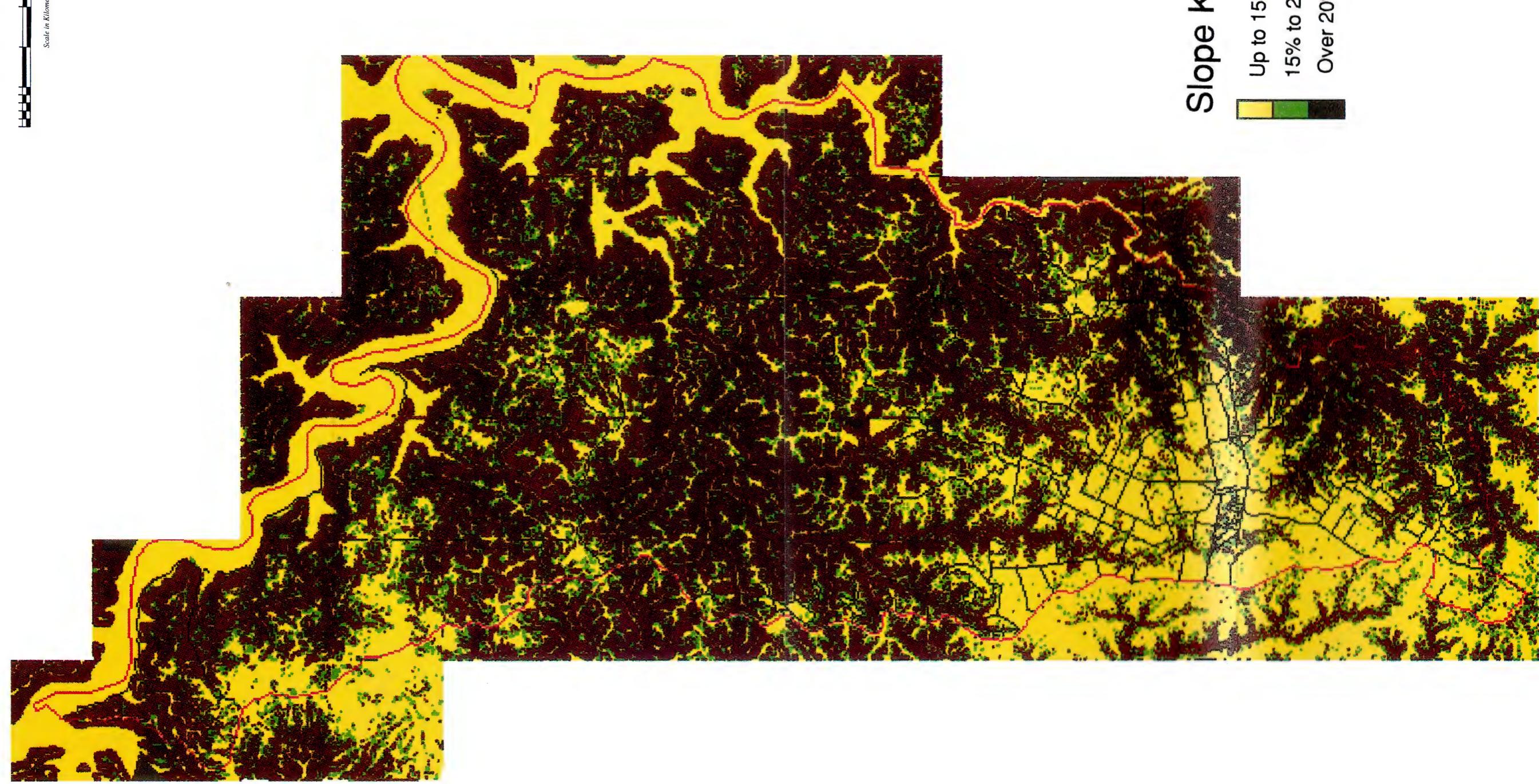
Figure 2.2

DEVELOPMENT CONTROL PLANS



GEOLOGY
Figure 4.1



SLOPES
Figure 4.2

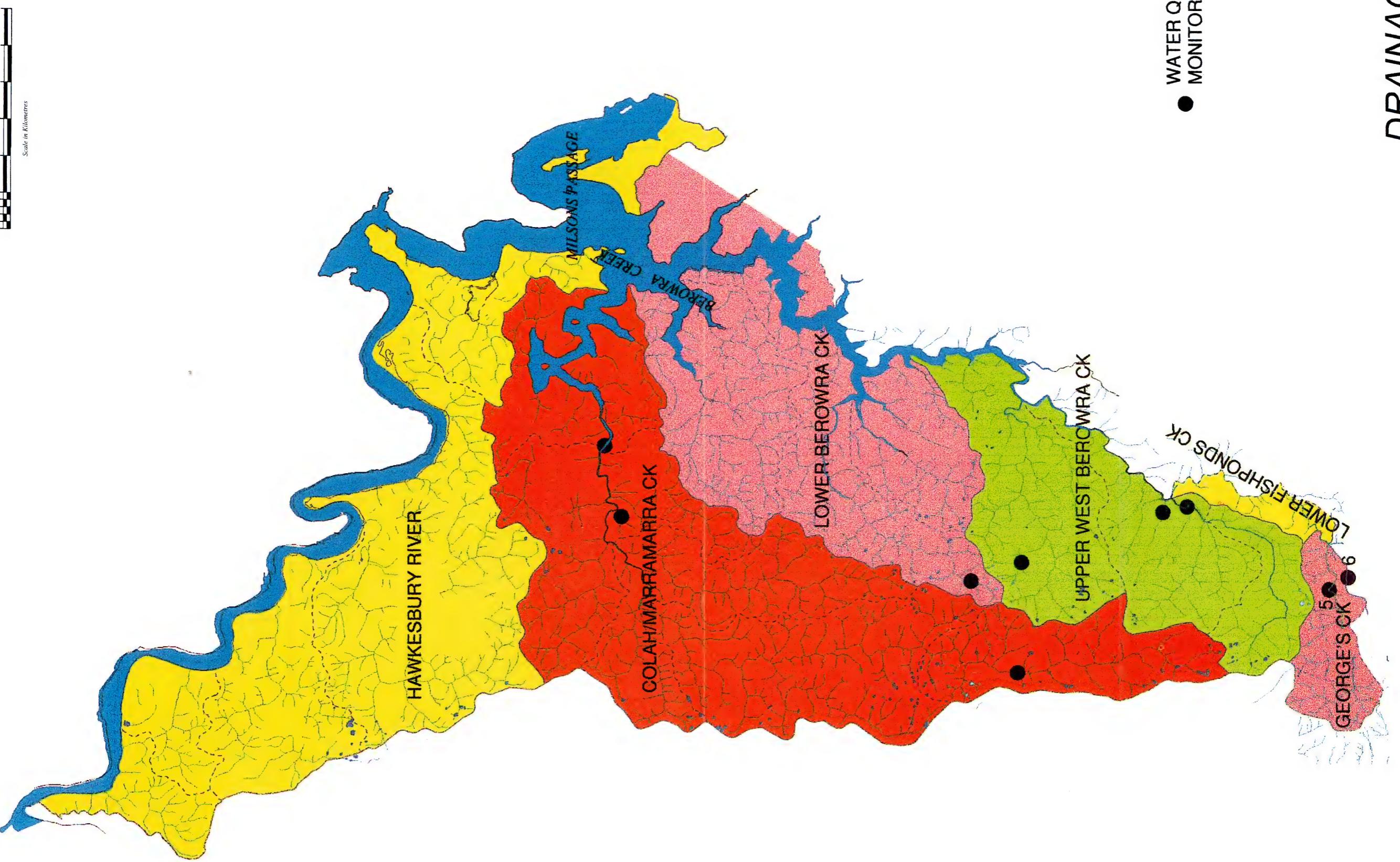


Figure 4.3

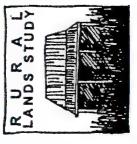
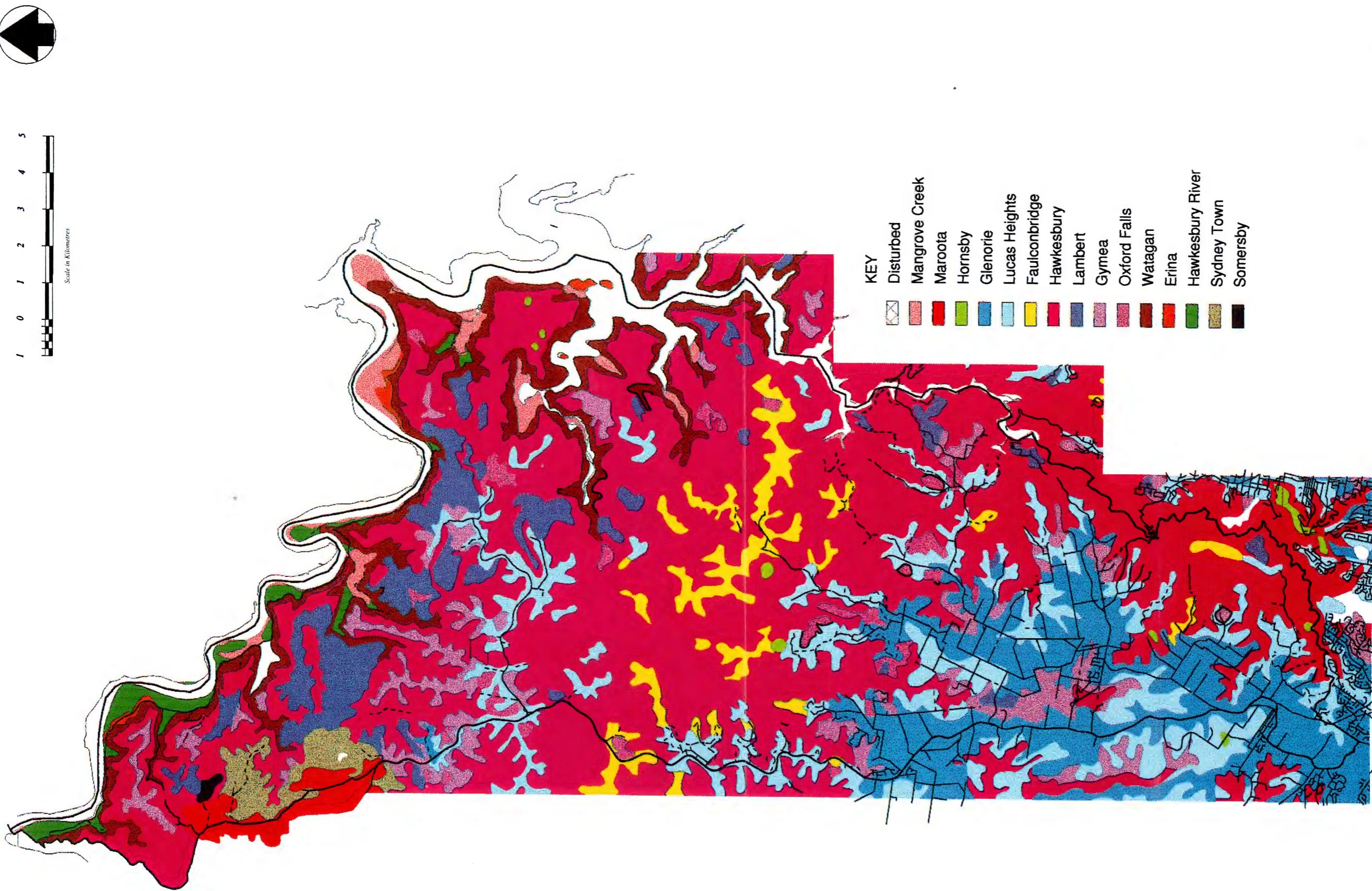




Figure 4.4

SOIL LANDSCAPES



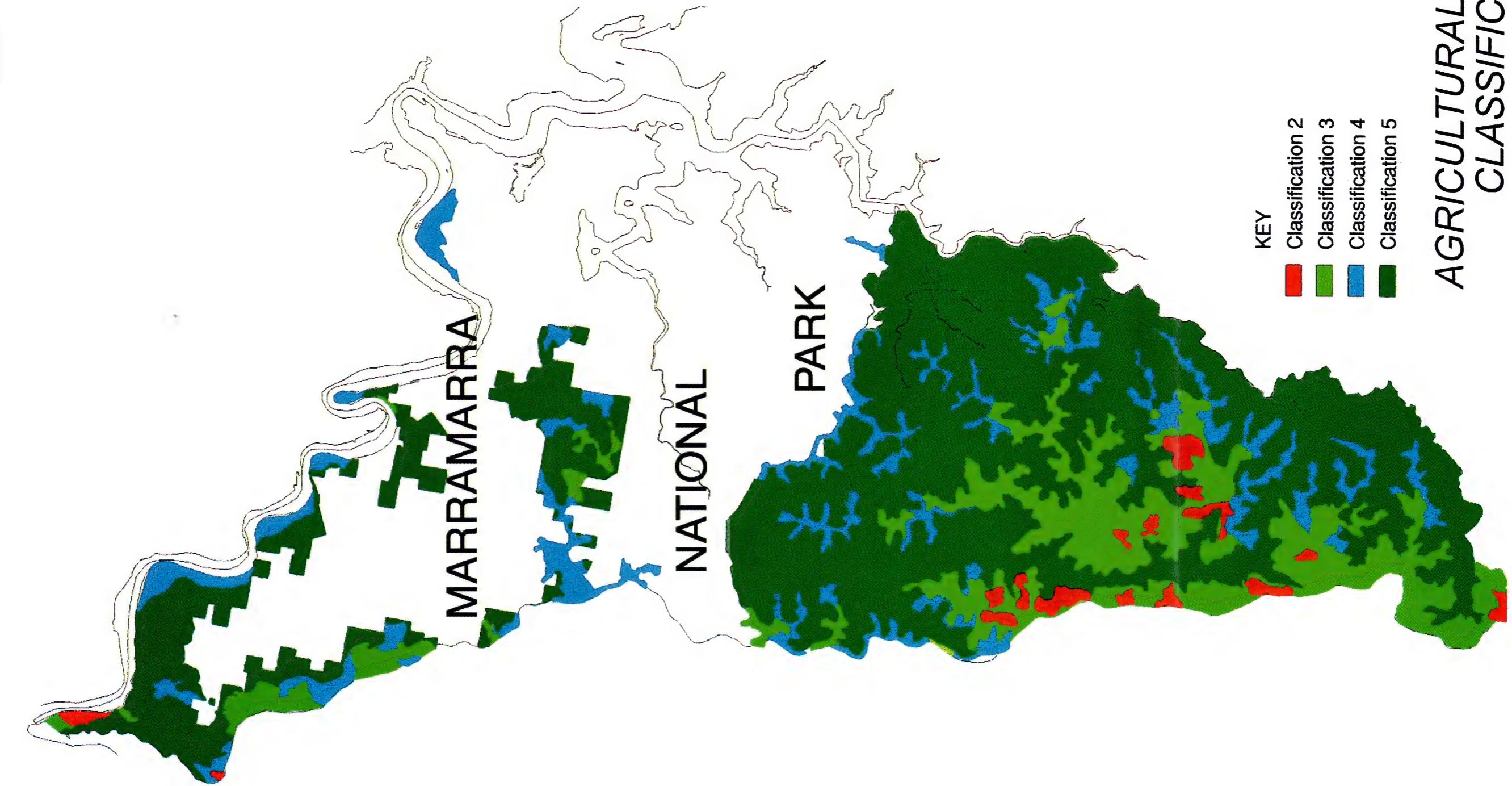


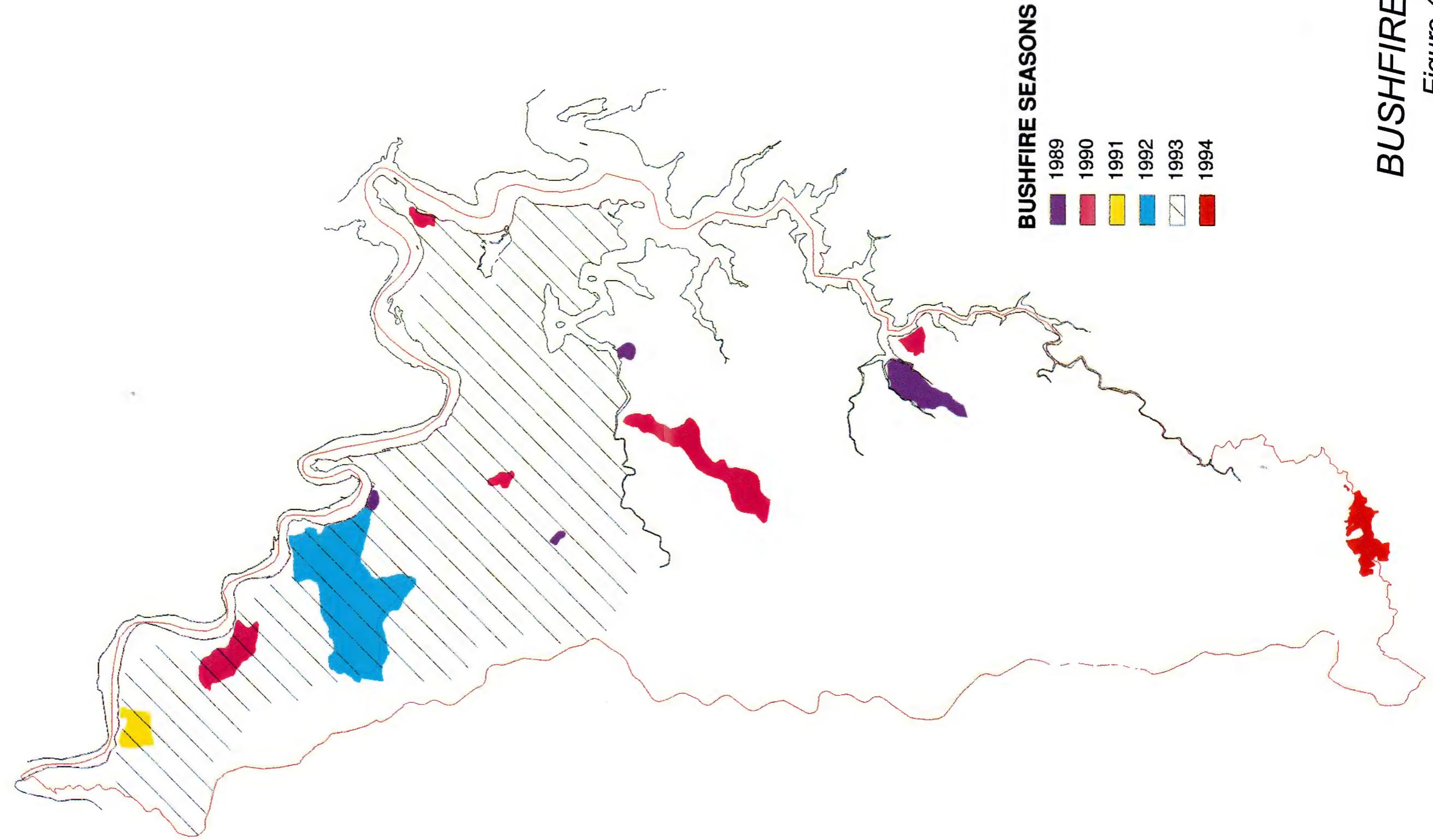
Figure 4.5





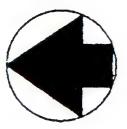
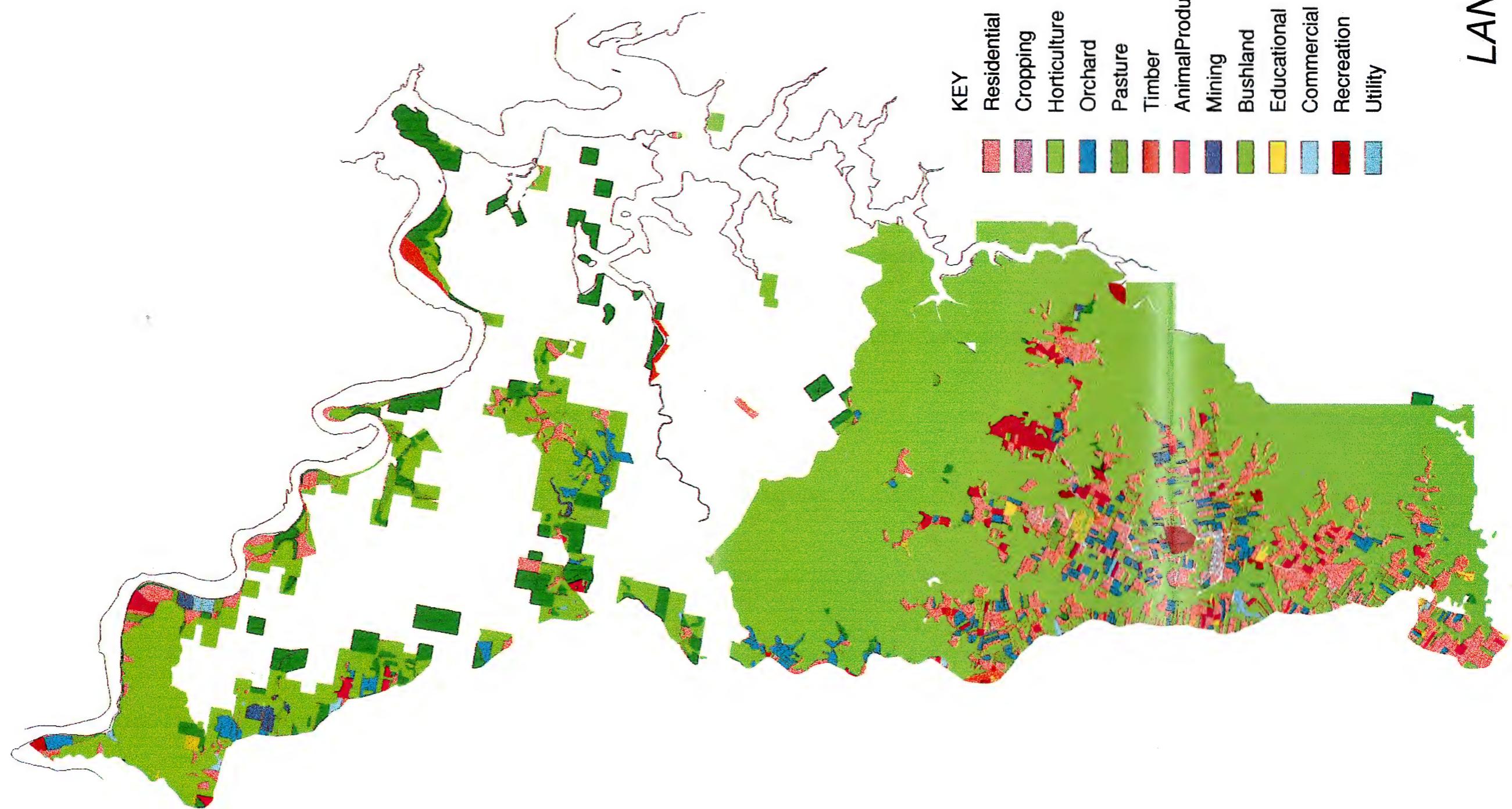
Figure 4.6

BUSHFIRES

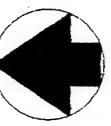




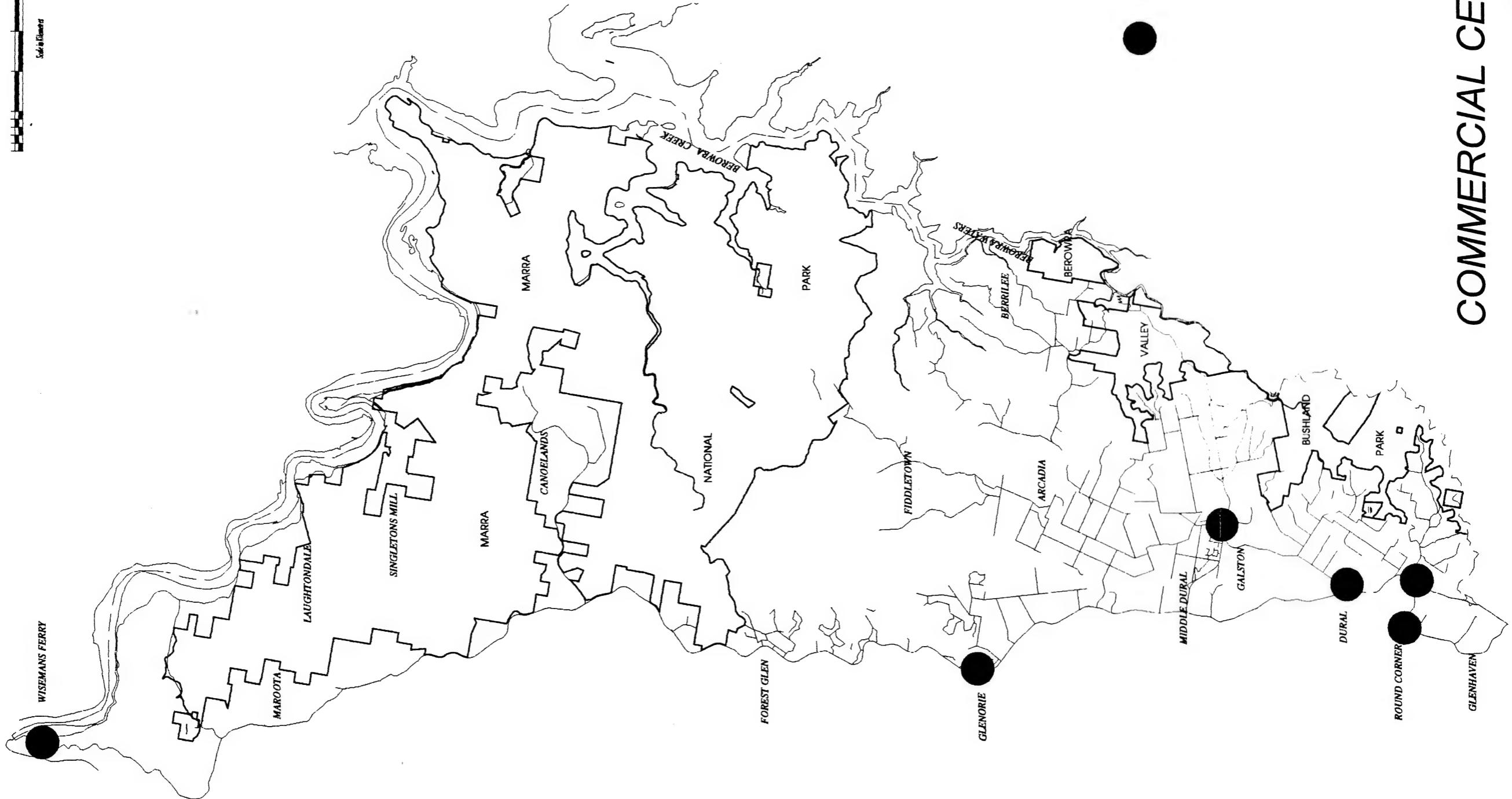
LAND USE
Figure 5.1



Scale in Kilometres



Scale in Kilometres
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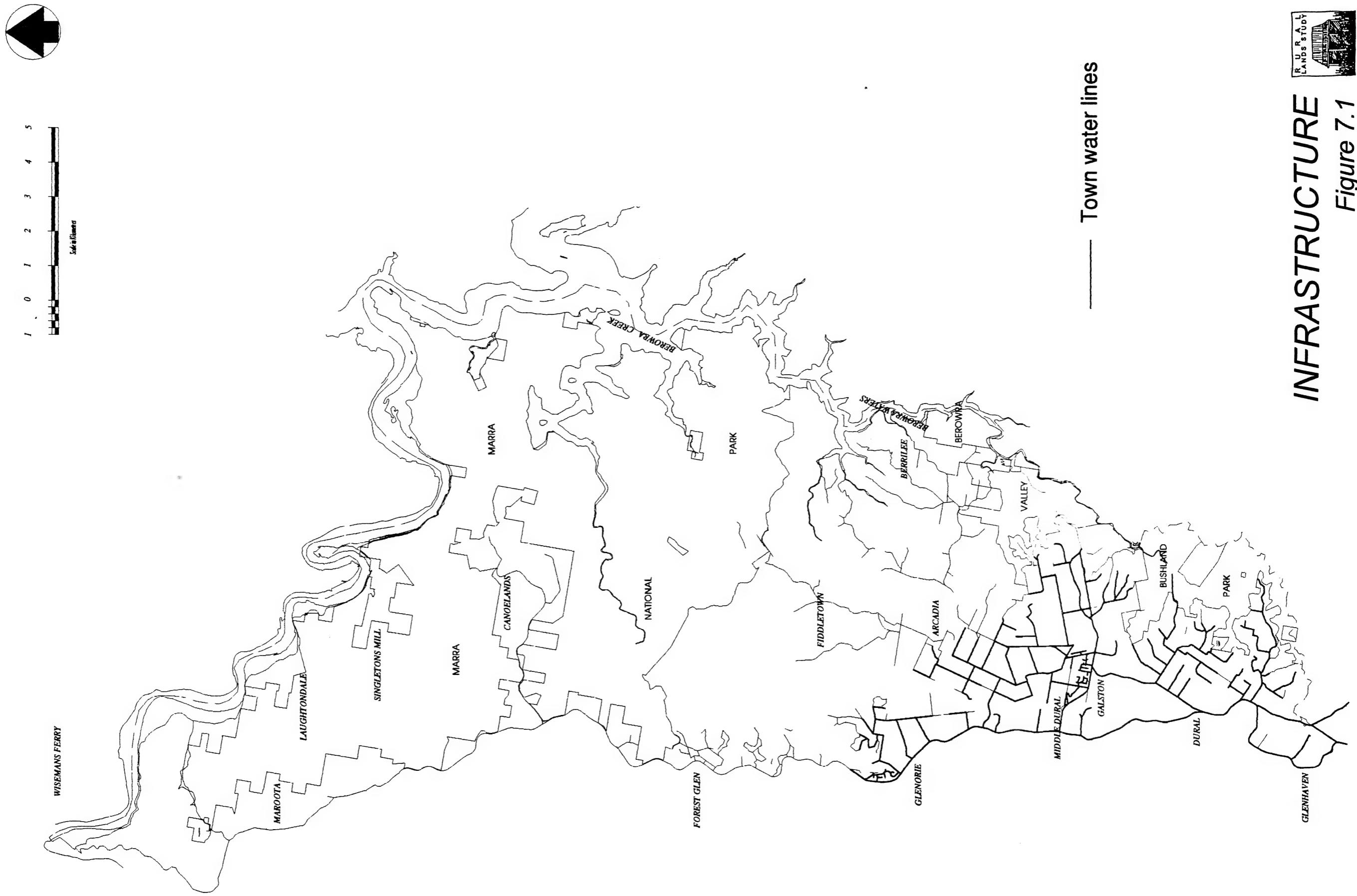


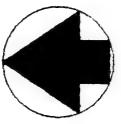
COMMERCIAL CENTRES
Figure 6.4



INFRASTRUCTURE

Figure 7.1





Scale in Kilometres

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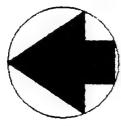
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Scale in Kilometers

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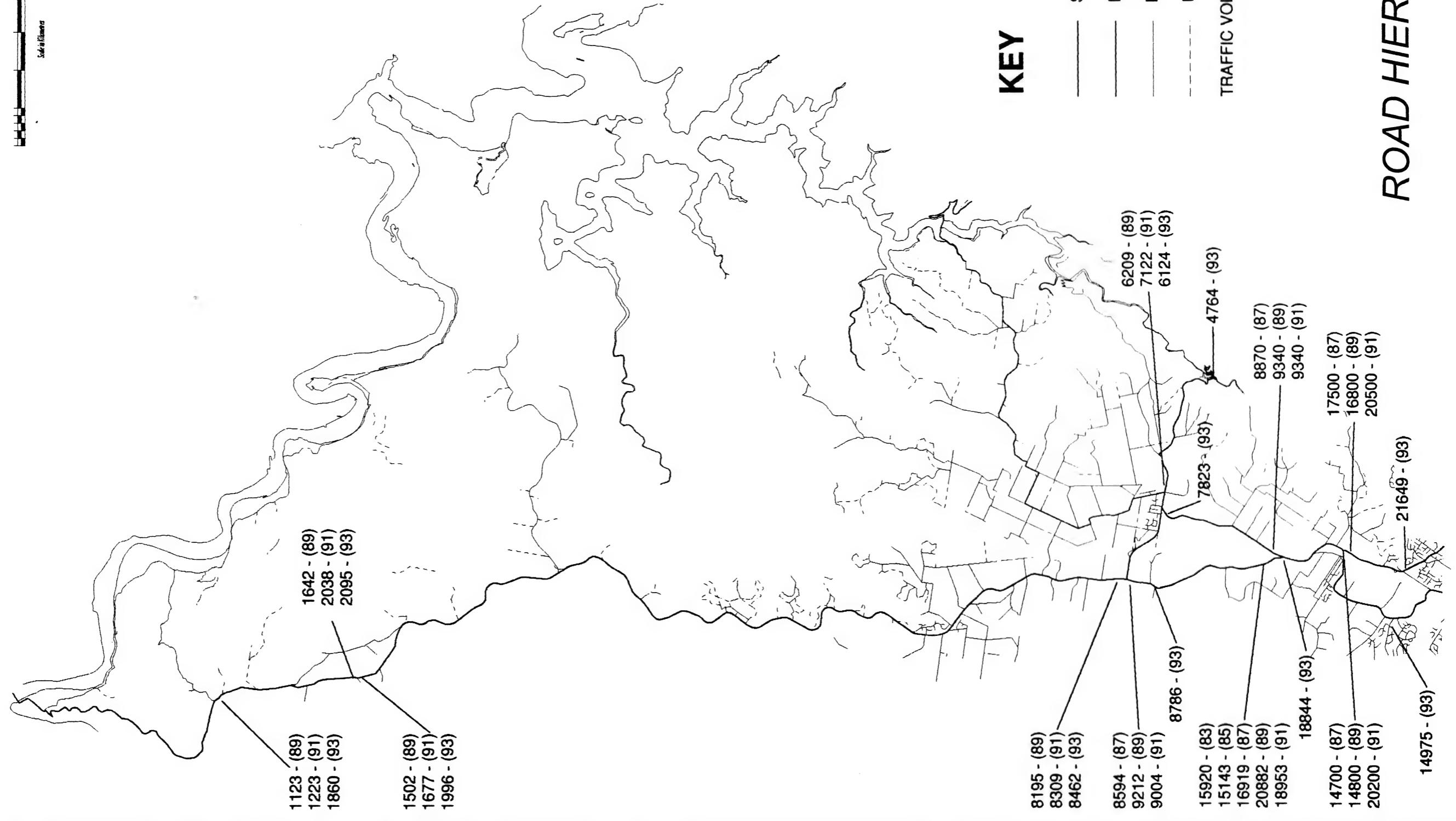


Figure 8.3

Figure 9.1

VISUAL QUALITY

- VISTA
- ◆ PANORAMA
- ▲ RESTRICTION
- ◆ PROMINENT ELEMENT

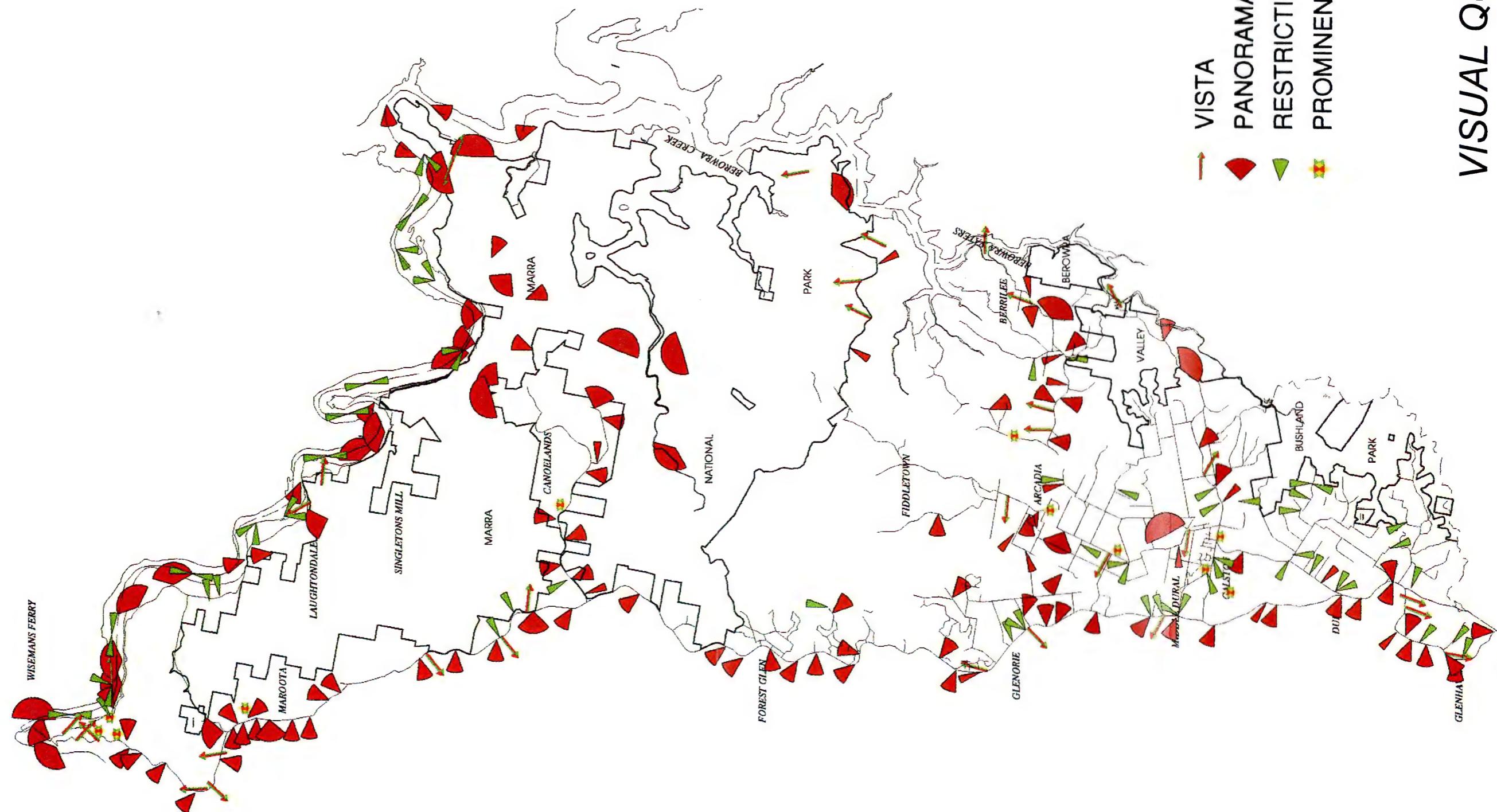
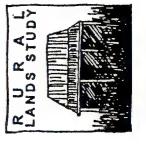
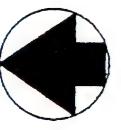
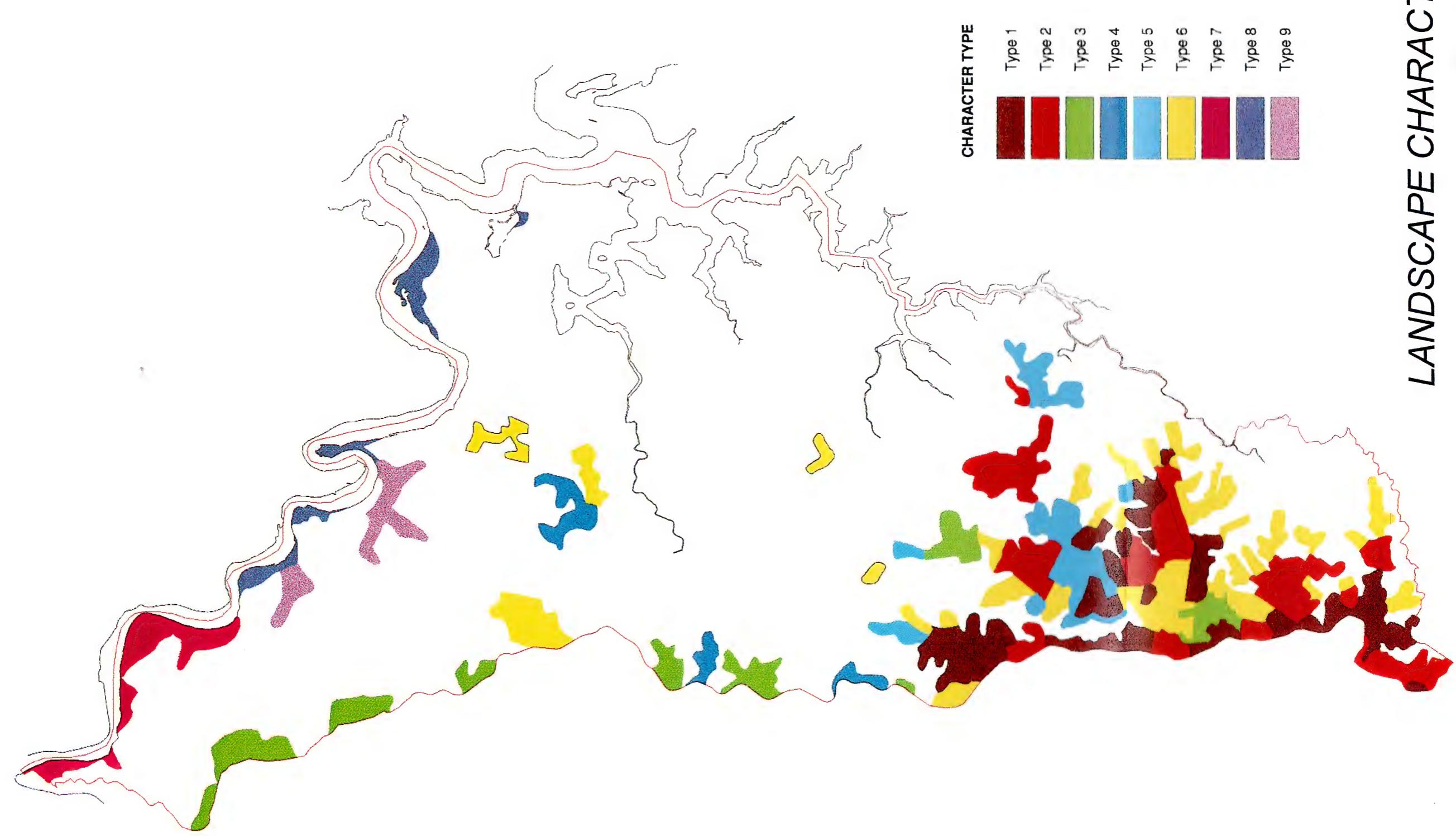


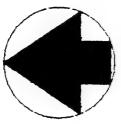
Figure 9.2



LANDSCAPE CHARACTER

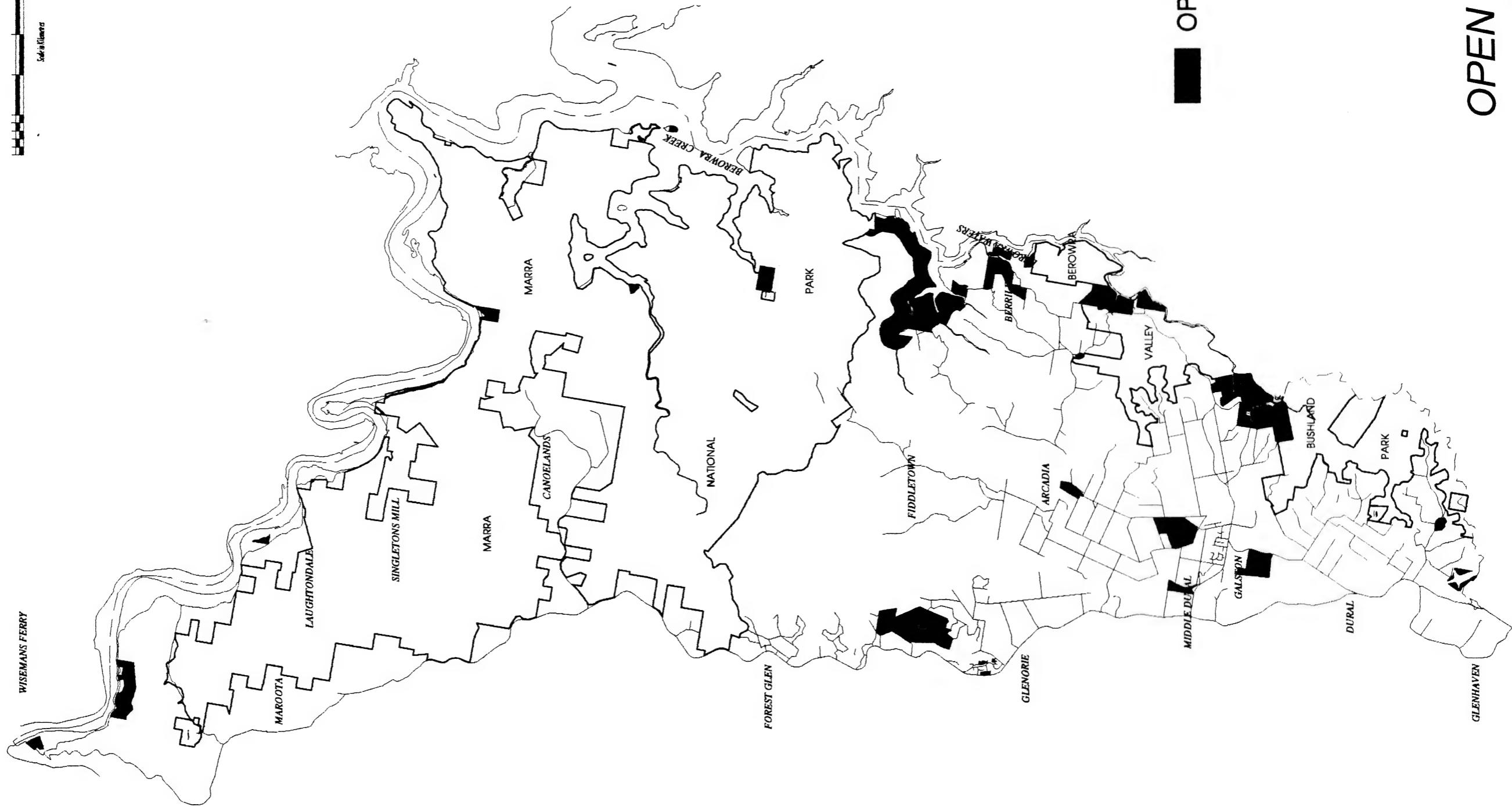


Scale in Kilometres



1 0 1 2 3 4 5

Scale in Kilometers

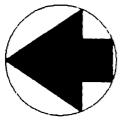


OPEN SPACE AREA

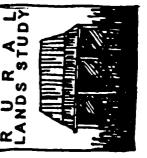
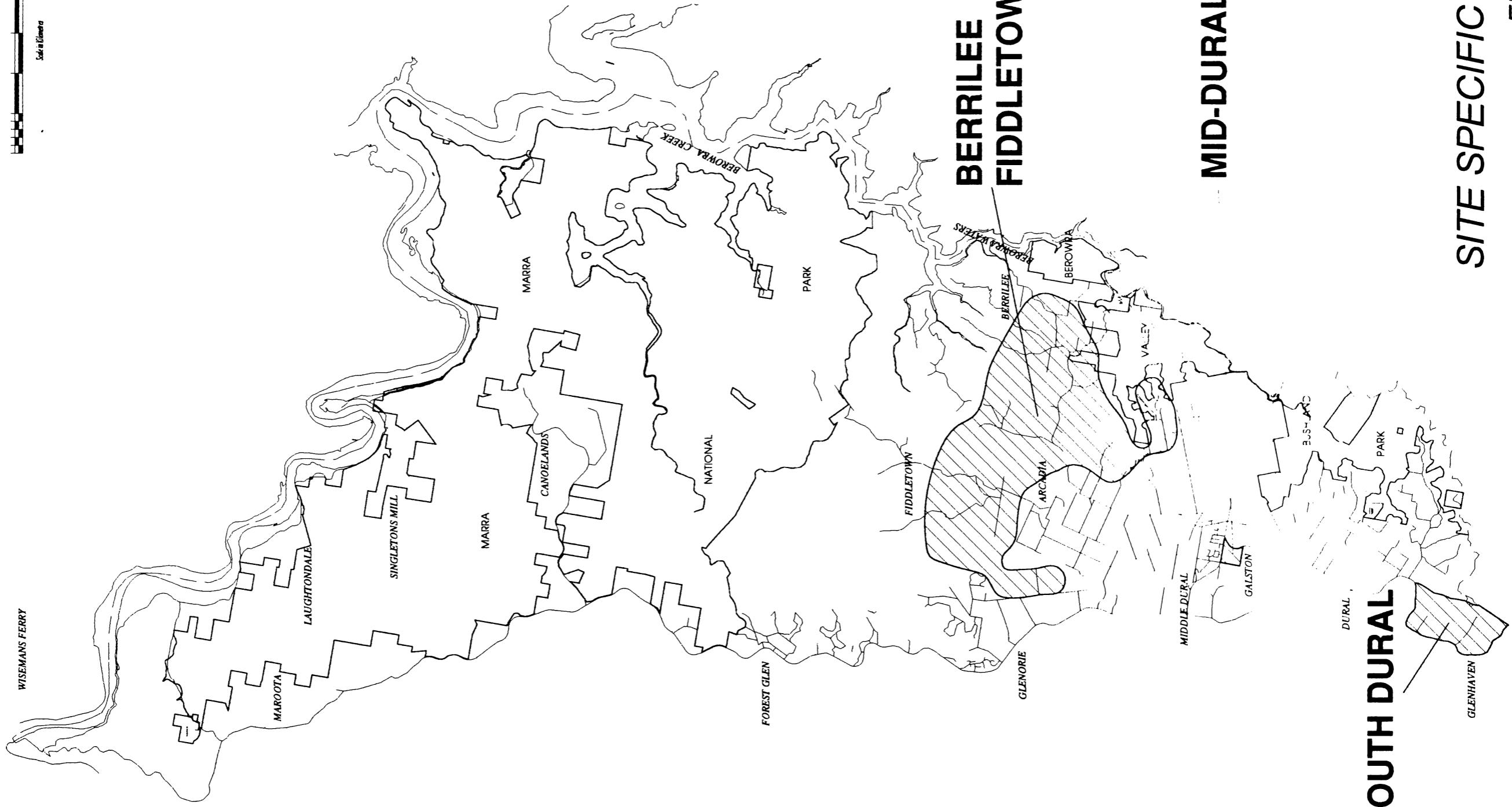


OPEN SPACE

Figure 11.1



1 0 1 2 3 4 5
Scale in Kilometres



SITE SPECIFIC AREAS

Figure 12.1

Part 2 - Planning Strategy

PART 2 - STRATEGY

The constraints, opportunities and principles identified in Part 1 - The Planning Report, provide the foundation for the preparation of a Planning Strategy for the study area. The strategy is most appropriately developed having regard to the objectives for this study, which are:

- * to investigate the role of rural lands within the catchment of the Hawkesbury River;
- * to identify the natural and built resources which warrant protection and enhance the environment;
- * to investigate the role of agriculture and other rural pursuits;

- * to provide direction for population growth, housing opportunities and commercial activities;
- * to identify and respond to the needs of the community;
- * to review and update the existing planning controls applying to the rural lands; and
- * to provide controls for development that improves the environment.

The following discussion recommends the means to achieve these objectives having regard to the findings and general principles of the planning report.

Objective 1: Investigate the role of rural lands within the catchment of the Hawkesbury River

The study area forms part of a wider environment and cannot be considered in isolation from that environment. Prior to considering the issues which affect the study area in detail, it is necessary to consider the role of the area as part of the wider Hawkesbury River catchment.

The study area is located in the lower part of the catchment of the Hawkesbury River. The Hawkesbury River has a total catchment area of 25,000km² which includes Goulburn, Lithgow, the Blue Mountains, St Albans and much of the Sydney region. The River has many functions including:

- * supplying water for agriculture, industry and human consumption;
- * a location of recreation and tourism;
- * a flora and fauna habitat;
- * a scenic landscape;
- * the discharge point for sewage treatment plants and stormwater drains, and
- * the location of in-stream and river bank extractive industries.

Many of these different land uses with the catchment are also reflected within the study area. The study area is an important location for agriculture, housing, tourism and recreation. These activities can impact upon the water quality, visual quality, recreation potential and economic value of the River.

In recent years there has been public concern about the poor condition of the River and the subsequent impact on the river uses. The objectives of the EPA Act, 1979, encourage the proper management of natural resources and the protection of the environment. Sydney Regional Environmental Plan No. 20 - Hawkesbury Nepean River (SREP No. 20) provides for a Total Catchment Management approach to planning within the catchment of the Hawkesbury Nepean River, including a framework for the preparation of Local Environmental Plans (LEP) and Development Control Plans (DCP). Clause 8 of SREP No. 20 states:-

"In preparing a River Management Plan applying to land to which this plan applies, the consent authority or the Director shall take into consideration -

(a) any relevant head of consideration in Schedule 4, namely
** water quality;*

- * significant vegetation habitats;
- * extraction;
- * heritage items;
- * scenic quality;
- * agriculture;
- * recreation and tourism.

- (b) the REP planning report; and*
(c) any representations made by a public authority."

SREP No. 20 is currently being reviewed in stages, although remains relevant in the context of this study.

The need for the protection of the Hawkesbury River and Berowra Creek catchments is also recognised in Issue 1 of the Rural Lands Study Sub-Committee report which states:

"Catchment protection should be a major determinant of land use and planning and management. Health of waterways is an indicator of how well the catchment is being managed, and water quality in both Berowra Creek and the Hawkesbury River indicate that their catchments need improved catchment management.

The aim is the protection of catchments to augment present and future plans of the various relevant government authorities."

The Hawkesbury-Nepean Basin, which includes the study area, is nominated in the regional planning strategy as an ecologically sustainable region and involves integrating economic growth with environmental protection and pollution control. (Department of Planning, 1995). Continued residential development within the catchment of the Hawkesbury-Nepean River is cited as a major contributing factor in blue-green algae blooms affecting the River.

The Planning Report indicated that water quality within the study area and the Berowra Creek catchment has deteriorated from that experienced in natural conditions. Overall the results indicate that water quality deteriorates as land use within a catchment changes from bushland to rural to urban development. As development occurs, it is important that measures are installed to minimise changes to water quality. Sampling results for turbidity, phosphorus, nitrogen and faecal coliforms highlight the impact that rural and urban land uses have on water quality. The extrapolation of the results indicates that continued rural and urban development within the

study area will further deteriorate water quality, unless mitigation measures are installed.

The National Strategy for ESD recommends land use decisions should be made with a view to long term environmental sustainability with particular emphasis given to avoiding the possibility of environmental degradation in accordance with the "precautionary principle". The need for ESD is also recognised in Issue 10 of the Rural Lands Study Sub-Committee report which states:

"development and activity in the rural lands should be encouraged to comply with Council's policy of ecologically sustainable development."

All planning controls should consider the effect of development upon catchments, and as a consequence be based on a total catchment management framework. As noted in Section 2.2.4, Hornsby Council has entered into an agreement with other statutory authorities to achieve Ecologically Sustainable Development (ESD) in the Berowra Creek catchment. Consequently, land use strategies should be considered in the context of ESD with particular regard to protecting and improving water quality in the catchments.

In recognition of the precautionary principle of ESD, where any proposal will have an adverse impact on water quality, or the impact cannot be scientifically and / or satisfactorily resolved, the proposal should not proceed.

Objective 2. Identify the natural and built resources which warrant protection and enhance the environment

The protection and enhancement of the environmental qualities of the Study Area will assist in promoting environmentally sustainable development. These qualities, particularly those associated with the natural environment, will have a continuing influence on the area. A strategy which addresses the constraints and opportunities of the Study Area in relation to the natural environment, visual qualities and heritage conservation is required to meet this objective.

Natural Environment

The Planning Study gave consideration to the land capability factors that limit or restrict development including geology, topography, soils, drainage, groundwater, flora, fauna and bush fires. The recognition of the influence of these factors on the Study Area enables the development of a strategy to protect and enhance the inherent environmental qualities. Such a strategy would be in accordance with the objectives of the EPA Act, 1979, which encourages the protection of the environment and the conservation of natural resources, including natural grass, forests and water.

Geology : The study area is underlain by sand, sandstone and shale resources at or near the surface and coal and petroleum resources at a depth of some 700m. The area contains valuable extractive resources that should not be sterilised through planning controls permitting incompatible land uses or prohibiting extractive industries and mines. Extractive industries have concentrated at Maroota to extract the Maroota Sand deposit, shale and friable sandstone and at Canoelands to extract shale and sandstone. The objectives of the EPA Act, 1979, encourage:

- * the proper management, development and conservation of natural resources, including minerals; and
- * the promotion and coordination of the orderly and economic use and development of land.

To assist these objectives, SREP No. 9 - Extractive Industries applies to the Maroota area, and permits extraction and provides controls for incompatible land uses. Council has undertaken a comprehensive management plan for extractive industries at Maroota and prepared a DCP for same. The Maroota area should be protected from further fragmentation and incompatible land uses

through appropriate planning controls, including a specific zoning to reflect the SREP No. 9 area. The DCP should be revised following the gazettal of the amendments to SREP No. 9 - Extractive Industries. Equally, controls for extractive industries should be further developed to apply to any extractive operation within the rural area, to protect the environmental qualities of the immediate and wider area.

All of the geological units provide a suitable base for foundations for building and construction activities. Consequently, geotechnical reports should only be required for development on steep slopes or involving extensive cut and/or fill.

Topography: The Planning Report noted that the topography associated with the remnant Wianamatta Group of shales around Galston and Dural consists of undulating to rolling hills with a local relief of 50-80m and slopes of 5-20%, whereas, the erosion of the Hawkesbury Sandstone has formed steep sided hills and valleys along the drainage lines. Local relief varies from 40 to 200m, with slopes ranging from 25% to 70% and rock outcrops having slopes from 50% to vertical. The most dramatic example of the steep topography is at Wisemans Ferry where the hillsides rise to 200m above the Hawkesbury River. The floodplains along the Hawkesbury River near Wisemans Ferry are level to gently sloping (0-5%) and have local relief of less than 5m.

The Planning report noted that steep slopes are a significant constraint to rural and urban development. Lands with slopes in excess of 20% are generally considered to be not suitable for agricultural or residential development due to engineering difficulties, site stability and erosion issues. The majority of these lands are already zoned Environmental Protection B (River Catchment). To protect sensitive areas from development and to better reflect land capability, the boundary of the Environmental Protection B (River Catchment) zone has been reviewed as part of this study. The comparison identified a number of discrepancies between the zone boundary and lands with slopes greater than 20%. The variations include both instances where steep land was not zoned Environmental Protection and conversely where gently sloping land was zoned Environmental Protection. It is appropriate that the zone boundary be rationalised to protect these lands with poor land capability. This includes Lot 1, DP 368108, at Gentlemans Halt and 18 allotments along Singleton Road at Wisemans Ferry which are currently zoned Residential A

(Low Density). The Lot at Gentlemans Halt has an area of 1.25ha, while the land at Wisemans Ferry has been subdivided into allotments with an average area of 944m². This amendment would preclude the further subdivision of these lands but would not preclude the erection of a dwelling on each.

Design guidelines and assessment criteria should be included in a DCP for the construction of dwellings and address the limitations imposed by topography, including construction techniques and limiting cut and fill.

Soils : It is important that urban and rural land uses occur on land that is capable of supporting the use. In instances where the soil is not capable of supporting the land use, high erosion, stability problems, flooding or the cracking of structures can result. Consequently, the development of land use strategies for the study area need to consider the capability of the soil.

Urban and agricultural activities should be consistent with land capability and development should be precluded from areas where the soil landscapes is unsuitable. The Planning Report indicates that the soil landscapes most suitable for agricultural use are Glenorie and Somersby, and those most suitable for urban development are Maroota, Somersby and Faulconbridge.

The soil landscapes which have low capability, or are not capable of rural and urban development, are the Hawkesbury, Deep Creek Watagan, Hawkesbury River, Mangrove Creek and Tacoma Swamp Soil Landscapes. It is acknowledged that development has occurred on these soil landscapes, however that development may have resulted in high erosion, slippage, cracking or flooding. It is important that the current land capability of an area is considered in preference to historical practices. The limited development potential of these lands should be reflected by introducing an Environmental Protection zoning where these soil landscapes coincide with other environmental constraints.

The Planning Report found that areas of acid sulphate soils should not be developed, drained or excavated, as they have the potential to kill aquatic flora and fauna. The location of acid sulphate soils generally coincides with estuarine wetlands which should be zoned to protect the wetlands and minimise the disturbance of acid sulphate soil.

Many land uses can or have the potential to contaminate soil which can affect future land uses. Contamination of rural lands can result from landfilling and waste disposal sites, petrol stations, stock dipping areas, pesticide storage areas, industrial activities or land heavily treated with chemicals for agriculture. In the event of rezoning or development proposals on land suspected of contamination, the level of contamination should be determined through soil sampling. The potential contamination of adjacent properties through runoff, groundwater flows and dust should also be examined.

The most effective means of preventing soil erosion is to retain the natural vegetation cover, minimise earthworks and install soil erosion and sediment control measures. Soil erosion and sedimentation controls are also the most effective means of reducing pollution from runoff as most pollutants are absorbed and transported by particulate matter.

As part of the development approval process, Soil and Water Management Plans (SWMP) should be prepared and assessed. The recommended soil conservation measures include:

- * restricting development on steep slopes;
- * the erection of silt fences to prevent sediment moving off-site;
- * the installation of drainage control measures to control water movement and quality;
- * the sowing of a cover crop on disturbed areas to minimise the time period that surfaces are exposed and reduce erosion;
- * the progressive landscaping of building and development sites as works are completed; and
- * the collection of silts and clays through flocculation where soils are dispersible.

These control measures should be incorporated into a DCP. The soil conservation measures approved through the SWMP should be installed prior to development and maintained until the development, including landscaping measures, are complete.

Under the Soil Conservation Act, 1938, the Soil Conservation Service has listed the Hawkesbury River, Berowra Creek and Marramarra Creek as "prescribed streams". To protect these watercourses from erosion and siltation, the consent of the Soil Conservation Service is required to be obtained prior to the destruction of any tree or shrub growing within 20m of the watercourse. The Service has also mapped land

within the study area which has a slope greater than 18 degrees (33%) and classified these areas as protected lands. To protect these steep lands from erosion, the consent of the Service is required for tree cutting, felling or clearing. Both of these controls should be incorporated into a DCP.

Drainage: The flow of runoff is an important consideration in the assessment of the natural environment. The northern third of the Study area drains directly into the eastward flowing Hawkesbury River via a number of small creeks, whereas, the southern two-thirds of the Study area drains into Berowra Creek and Marramarra Creek, which flow to the Hawkesbury River.

The collection of runoff by dams can have an adverse effect on downstream water quality, as the runoff volume is insufficient to flush pollutants through the system. However, dams may also have a positive effect on pollution as they can act as both sediment traps and nutrient filters. Sediment and the attached nutrients being transported by runoff are trapped in the dam and settle out of suspension. The growth of aquatic plants in dams also assist to improve water quality as the plants are able to use the nutrients for their growth. Consequently, there needs to be a balance in the management of runoff between the storage and flow of water.

Catchments also represent a natural unit for land resource management. Activities within one part of the catchment can have an impact upon another part of the catchment. For example, pollution in the upstream areas of Berowra Creek, such as Cherrybrook, impacts on the water quality at Berowra Waters and within the Hawkesbury River. The decreased water quality can impact upon aquatic flora and fauna, tourism, recreation and the fishing and oyster industries.

The philosophy of Total Catchment Management involves the co-ordinated use and management of land, water, vegetation and other physical resources and activities within a catchment to ensure minimal degradation and erosion of soils and minimal impact on water yield and quality and on other features of the environment (Cunningham, 1986). Through the appropriate and co-ordinated management of the land within a catchment, the environmental qualities of the catchment can be maintained.

In terms of water quality, the most appropriate measure is to control pollution at its source, thereby restricting the movement of pollutants

into the groundwater or watercourses. Control measures are necessary both within the Study area and within the catchment at upstream locations.

Guidelines for the protection of the natural drainage system should be introduced for the Study area. Drainage from sites should reflect the pre-existing or natural situation in terms of location, quantity, quality and velocity of runoff. The strategy should include the continuation of the water quality monitoring program, water conservation strategies and waste water disposal strategies. Water quality improvements should also be considered in the context of stormwater drainage systems.

There are a number of water quality measures which can be continued or implemented, including:

- * the continuation and further development of the water pollution surveillance and monitoring program;
- * preserve wetland areas which act as nutrient "sinks", removing nutrients from the waterway;
- * develop farm dams as artificial wetlands;
- * develop wetland ponds;
- * encourage recycling and conduct anti-littering and education programs;
- * minimise tree removal and earthworks and ensure the use of silt fences;
- * encourage the use of domestic effluent systems which do not rely on water and infiltration, and conduct inspections on existing disposal systems to ensure their correct functioning;
- * encourage water conservation strategies, such as dual flush toilets, water saving shower heads, rainwater tanks etc);
- * review existing waste water disposal arrangements to ensure that no waste water drains or percolates to natural waters;
- * review existing policies on septic tank and aerated water effluent disposal systems;
- * promote the growth of native species to minimise the need for insecticide and pesticide for introduced and exotic species;
- * ensure that potentially acid sulphate soils are not exposed; and
- * public education campaigns.

The extent and nature of flooding downstream of Wisemans Ferry is currently being reviewed as part of the Public Works Department's Hawkesbury Floodplain Management Study. The results of the Study are not yet available, although it is likely that the Study will have implications

for flood liable lands along the Hawkesbury River. It is appropriate that the existing controls be reviewed upon completion of the Hawkesbury Floodplain Management Study.

Similarly, the effect of sea level change associated with the Greenhouse Effect and its implication on floor levels for areas adjacent to watercourses, should be reviewed upon the completion of the Hawkesbury Floodplain Management Study.

Groundwater: Groundwater occurs throughout the study area. However, the geological units have low permeability, yielding small volumes of groundwater. The exception is at Maroota where perched water tables and a more extensive groundwater resource is evident. It is estimated that the total volume of groundwater storage for the main aquifer in the Maroota sand deposit is likely to be in excess of 8,000 Mega Litres (ML), with an annual recharge volume of 3,000ML.

Water from both the perched water table and groundwater resources is utilised for agricultural production and the natural discharges from springs are important to the viability of downstream ecosystems, such as wetlands. The vitality and longevity of the ecosystem is dependent on base flows associated with groundwater discharges.

To protect the groundwater supplies, a limit to extraction of the 180m AHD level was adopted by Hornsby Council, based on a recommendation of the Management Plan for Extractive Industries at Maroota and incorporated into the Draft Extractive Industries - Maroota DCP. It is appropriate that this provision be retained in the DCP, to maintain the integrity of the groundwater.

Groundwater also has the potential to be polluted by chemicals leaching through the soil. Controls should be incorporated into a DCP to encourage the collection, reuse and treatment of polluted water to minimise the infiltration of pollutants into the soil and groundwater.

Flora: The study area contains extensive bushland areas with approximately 81% of the Study area covered by bushland. Of this area, 132km² of bushland is protected within Marramarra National Park, 10km² within Berowra Valley Bushland Park (west of Berowra Creek), and the remainder located throughout the Study area in smaller reserves, Crown land and privately owned land.

Vegetation is an important part of the natural environment as it provides a habitat for fauna, maintains biodiversity including local genetic stock, provides microclimate control, enhances scenic quality, reduces soil erosion, and assists in protecting water quality. The need for the protection of the native vegetation, including the understorey, is also recognised in Issue 2 of the Rural Lands Study Sub-Committee report which states:

"Protection of native vegetation is vitally important for a number of reasons including catchment protection and conservation of biodiversity. The attached statement on "Native Vegetation of Hornsby Shire's Rural Area and its Significance" to be taken into consideration."

Human occupation in bushland areas has impacted upon the vegetation through clearing, pollution and altering the natural fire management. Bushland areas can also impact upon fauna and residents through increased threat from bush fires. Over the 200 years since 1788, human activity has led to clearing of much of the vegetation for forestry, agricultural and residential purposes. The more fertile ridgeline shale soils, which are more suitable for agriculture and housing, have been cleared of vegetation to a greater extent than vegetation on the less capable sandstone soils.

Despite the land management practices of the past 200 years, Hornsby Shire still has a high diversity of native plant species, with in the order of 1,000 species occurring. Of these species, 24 are considered to be rare or threatened, 18 of which occur within the Study area. Combinations of these species form 25 different vegetation communities within the Study area. The location and distribution of the communities is dependent upon terrain, soil type, geology and microclimate variations.

Generally, the communities associated with the Hawkesbury Sandstone are well represented in public reserves, such as Marramarra National Park and Berowra Valley Bushland Park. The infertile soils and steep terrain limits other uses and restricts clearing activities. However, the plant communities related to the more fertile soils have limited distribution within the Study area and have to a large extent been cleared for rural and urban development. The communities found on slopes adjacent to the Hawkesbury River and Berowra Creek are generally well represented in major reserves. The three communities associated

with alluvial flats along the Hawkesbury River and other watercourses are poorly conserved within the reserves, as a consequence of clearing activities and the limited occurrence of alluvial flats in reserves. The two intertidal communities, communities W (mangroves) and Y (saltmarsh) are poorly represented in major reserves, as reserve boundaries usually coincide with the high tide level. Based on distribution, the communities most in need of conservation within the Shire and Study area are communities B, E, H, I, J, K, M, N, P, R, S, W, X and Y, these communities should be identified in a DCP and controls prepared to limit inappropriate activities.

The waterway is also the habitat of seagrasses, such as eelgrass (*Zostera capricorni*), which occurs within some of the tributaries of Berowra Creek, but not along the Hawkesbury River. The significance of the seagrass beds along Berowra Creek and the strategies for their protection have previously been assessed under the River Settlements Planning Study (Hornsby Shire Council, 1993).

To retain the biological diversity of bushland areas, it is desirable to improve the core bushland areas and ensure linkages between such areas to allow species to migrate. Linkages are particularly important in allowing recolonisation by fauna and plant species from nearby areas following disturbances such as bushfires. To facilitate the protection of the identified core bushland areas, significant bushland parcels and corridors should be incorporated into a Draft Local Environmental Plan and guidelines incorporated into a DCP.

Marramarra National Park and Berowra Valley Bushland Park are the largest remnant bushland areas within the Study area and form core fauna habitats. Combined with bushland in adjoining areas, these areas are capable of sustaining native fauna and plants in the long term and are locations where essentially natural biological processes can be retained. To improve the ability of core bushland areas to retain their biological diversity in the long term, it is desirable to ensure linkages between such areas to allow species to migrate. Such linkages are particularly important in allowing recolonisation by fauna and plant species from nearby areas following disturbances such as bushfires.

The State Government has proposed a southern extension to Marramarra National Park. The proposal would protect steep bush covered Crown Land from development, including land identified

by this study as being unsuitable for urban and rural development because of steep slopes, poor land capability, significant flora and fauna habitats, aboriginal sites, visually important landscapes and to protect natural catchments. However, no specific details or mapped boundaries of the southern extension have been published. The proposal is supported by the Rural Lands Sub-committee who state:

"The Sub-Committee encourages Council to press for the inclusion of contiguous Crown Lands into Marramarra National Park."

The proposal should be supported by Hornsby Council to protect these sensitive lands from development. However, it would be inappropriate to rezone the lands to National Park until the proposal proceeds and boundaries designated.

The protection of rare species is important to prevent extinction and to maintain biodiversity. The threats to rare species include land clearing for agriculture or urban development, fire frequency, weed competition, roadworks, grazing, plant collecting, flooding, pollution, salinity, dieback, recreational activities and mining.

The identification of rare species through vegetation surveys is the first step towards preservation. Development proposals for areas covered by bushland or likely habitats of rare species should be accompanied by a vegetation survey. Where rare species are identified, a number of different conservation strategies could be considered, including modification of the development proposal, land acquisition, protection from fire, habitat protection, cultivation of the species, education, habitat management and research. The appropriate method of conservation varies between species, their form, habitat, location and abundance.

NSW Fisheries "Estuarine habitat guidelines" (1991) recommends that:

- * all wetlands (seagrasses, mangroves and salt marshes) be mapped and zoned or reserved for environmental protection;
- * foreshore buffer zones of at least 30m width be created to protect foreshores and separate developments from sensitive habitats and allow for changing distribution; and
- * mangroves be included in tree preservation orders.

The larger stands of saltmarsh (community X) and mangroves (community W) which are

recognised as significant are zoned Environmental Protection A (Wetland) under the Hornsby Shire Local Environmental Plan. The zoning is a means of protecting and labelling the mangrove areas in recognition of their environmental significance and allows land use to be controlled. A number of these stands are also identified under SREP No. 20 - Hawkesbury Nepean River, which also restricts development. The wetlands identified under SREP No. 20 have recently been reviewed by the Department of Urban Affairs and Planning and now include only those wetlands of regional or State significance. As part of this study, the significance of the wetlands along the Hawkesbury River and their boundaries was assessed. In particular, the differences in the mapped wetland boundaries depicted on SREP No. 20 (Amendment No. 2) and the HSLEP were reviewed (Appendix F). Of the 13 wetland areas surveyed, it is recommended that:

- * the HSLEP wetland zone boundary be deleted for the two wetland areas which have been extensively disturbed;
- * the boundaries of the six wetland areas zoned under the HSLEP be amended to reflect SREP No. 20 (Amendment No. 2); and
- * the zone boundary of the other five wetland areas be adjusted to better reflect the actual wetland area.

Consequently, it is appropriate that the Environmental Protection A (Wetland) zone boundaries be amended to better reflect the location of regionally and locally significant wetlands. The provision of a 30 m buffer area should be incorporated into a DCP in accordance with the Estuarine Habitat Guidelines. Hornsby Council's Tree Preservation Order currently applies to Mangroves and does not require amendment in this regard.

It is important that plants used for landscaping do not invade the natural bushland, as they can out-compete the native species. Consequently, Hornsby Council requires landscaping plans to be submitted with Development Applications to ensure appropriate vegetation is planted. The landscape plans are also used to prevent large barren areas and to improve screening and visual appearance. Also potentially detrimental to native species is the disposal of effluent and garden and agricultural refuse which increases the nutrient level in the soil and can encourage the growth of weeds. Controls to mitigate these impacts should be incorporated into a DCP.

The DCP should also contain controls which reflect the provisions of the Tree Preservation Order, State Environmental Planning Policy No. 19 - Bushland in Urban Areas and Hornsby Council's code entitled "Requirements for Development, Building and Subdivision on Land Adjoining Bushland".

Fauna : The Study area contains extensive areas of bushland, which provides a variety of habitats, from ridge tops to valley bottoms and watercourses, for many species. A total of 388 native terrestrial vertebrate animal species have been recorded within the Shire, which includes 29 frogs, 51 reptiles, 55 mammals and 253 birds. In addition, 18 introduced fauna species have been recorded. Of this total number, some 38 species are considered endangered or threatened. The number of invertebrate species, such as insects and spiders, occurring within the Study area is unknown, but is likely to be in the order of 100,000 species. The Hawkesbury River, Berowra Creek and their tributaries also provide a habitat to a variety of molluscs, crustaceans and 90 recorded species of fish.

The preservation of fauna is best achieved through the preservation of habitat and the maintenance of fauna corridors as detailed under the flora section. The movement of many terrestrial species is limited by the bushland being fragmented by roads and development, however, some species could maintain their mobility through the establishment and maintenance of bushland corridors.

Controls should be incorporated into a DCP requiring a fauna survey to be undertaken where a development or activity :

- * involves the clearing, removal or alteration of bushland;
- * is adjacent to a National Parks, Nature Reserves, Bushland Parks, public open space (except playing fields or other open areas) or other bushland areas; or
- * involves the disturbance to the habitat of endangered fauna.

Where the survey identifies the potential for a significant impact on endangered fauna, a Fauna Impact Statement should be prepared.

Native fauna can also be adversely affected by the introduction of domestic pets, specifically cats and dogs. The domestic animals are known to attack and injure or kill native animals. As much of the Study area is surrounded by Marramarra

National Park, Berowra Valley Bushland Park and undisturbed crown land which contain pristine bushland and fauna, domestic pets should be kept under control and not allowed to roam through the bushland. Measures should be introduced in a DCP to ensure that the native fauna in the study area is not prejudiced by human interference.

Bush Fire Hazard : The Planning Report found that the study area is subject to a high bush fire threat especially to properties adjacent to bushland. The need to balance development in bush fire prone areas with the preservation of bushland is also recognised in Issue 13 of the Rural Lands Study Sub-Committee report which states:

"Existing bushland should not be sacrificed in order to protect existing or future development from the danger of bushfire."

Where a threat has been identified, the zoning, permitted land uses and development standards need to be appropriate for the hazard. In order to control development in high bush fire hazard areas, development consent should be required for:

- * all dwellings, to ensure that the appropriate buildings standards can be applied;
- * development which may start bush fires or impede fire fighting services, eg generating works, sawmills;
- * development in which human activity is concentrated at particular times, eg churches, community halls, child care facilities, educational establishments, camps, or commercial and retail premises;
- * development which may be difficult to evacuate eg hospitals or units for aged people; and

- * development which can create control difficulties within their confines eg bulk stores, stock and sale yards, or warehouses.

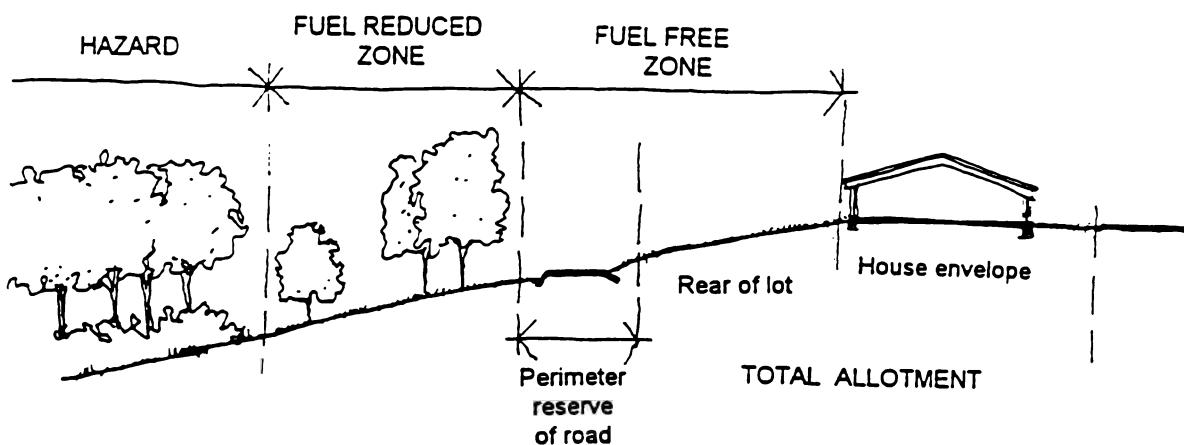
The planning provisions should also provide for development that reduces risk and serves as a buffer, as safety refuges for evacuated persons or as water supply points eg tennis courts, golf and race courses, sporting ovals and playing fields, or swimming pools.

A Fire Protection Zone, incorporating a Fuel Free zone and Fuel Reduction Zone, is the distance between the bushland area and the location in which dwellings can be built and can vary in distance, depending on slope and aspect, as indicated in the figure below. To reduce the potential impact of bush fires, it is appropriate to include these guidelines in a DCP.

The design of dwellings, the choice of materials and other measures can influence the risk of ignition. The following measures should be incorporated into a DCP to reduce this risk and mitigate the potential impact of bushfires:

- * brick construction, non combustable materials and external cladding;
- * wire mesh on doors and windows;
- * sealing under floor areas;
- * roof with no valleys to trap debris;
- * boxed in eaves;
- * landscaping requirements;
- * uninhibited access for fire fighting equipment including details of gradients and manoeuvring areas; and
- * a water tank with 10,000L of capacity dedicated for fire fighting purposes with a 38mm storz outlet with gate valve, and enough cleared space to locate a portable pump.

Fire Protection Zone for Subdivision



Air Quality : The study area has good air quality which should not be impacted by future development. The need for the protection of the air quality of the area is also recognised in Issue 3 of the Rural Lands Study Sub-Committee report, which states:-

"The present relatively high quality of air is to be maintained. The EPA and other authorities should provide suitable guidelines."

Land uses which would significantly impact upon the air quality of the area should be prohibited through the LEP. Controls on emissions and dust generation should be incorporated into a DCP to ensure that the impact on air quality is assessed and controls installed.

Scenic landscapes

Of all the senses used by humans to relate to their surrounding environment, the visual senses provide the greatest perception. The Study Area has both extrinsic and intrinsic scenic qualities which generally derive from its natural features and rural land use. The protection and enhancement of these scenic qualities contributes to an area's identity. The need for the retention of the rural character of the area is also recognised in Issue 7 of the Rural Lands Study Sub-Committee report which states:-

"The visual quality of the rural lands is recognised as being of great importance to both residents and visitors. Among the visual qualities that are valued are: small scale roads; distance between houses; visual variety of natural and manmade landscapes; broad vistas; trees, roadside verges; obvious presence of rural activities."

The rural lands of Hornsby Shire have a range of visual qualities and characters ranging from among the most spectacular in the State to more modest. The landscapes of this area are changing under the influence of natural processes, land use and pressure for settlement pattern changes. This is a normal process to which most settled landscapes are subject.

Changes to the land use and settlement pattern of the rural lands have the potential to alter the visual quality of the area in the future. These changes will occur both naturally, as a result of economic forces and technologic changes in the

rural environment, and as a result of future planning and ongoing development of the area.

All landscapes deserve appropriate attention to the conservation of their visual qualities. The means to achieve this depends on the visual character of the landscape and decisions as to whether this character should be retained or altered in the future. Alteration could involve rehabilitation, adaptation, enhancement or change to another character. A change in character should also enhance and complement the character of the area.

Three of the landscape character types within the study area are considered to have State significance (types 7, 8 and 9), one has regional significance (type 1) and the remaining 5 have local significance. Controls to preserve the character of each of these character types should be incorporated into a DCP and considered in any evaluation of proposals to modify zoning provisions.

The scenic quality of the area is also experienced by people moving through the area on the major road and water corridors. Of particular importance is the rural character of the area. Controls to maintain and enhance the views from these corridors should be incorporated into a DCP and considered in any evaluation of proposals to modify zoning provisions.

Heritage resources

Heritage resources within the area comprise both Aboriginal Heritage and European Heritage.

Aboriginal Heritage: The study area contains abundant evidence of Aboriginal occupation, including engravings, grinding grooves, paintings, shelters and habitation deposits. In the past, Aboriginal sites have been unknowingly destroyed and threatened by development because their existence and significance was unknown. In addition, some Aboriginal sites may have special ceremonial or spiritual significance and should not be visited by men, women or non-initiated persons. Consequently, the management of sites is a complex and difficult issue.

The National Parks and Wildlife Service is responsible for protecting and managing Aboriginal relics and sites, however it does not have a comprehensive register of all sites within New South Wales.

Under the National Parks and Wildlife Act, 1974 anyone who discovers an Aboriginal site has a legal obligation to notify the National Parks and Wildlife Service. However, there is a need to comprehensively identify Aboriginal sites to ensure adequate protection and management in the future. In this regard, Hornsby Council is currently undertaking an Aboriginal Heritage Study for the whole of the Shire, excluding National Parks, concentrating on areas which are currently under development pressure. The study is being undertaken in consultation with the National Parks and Wildlife Service and the Metropolitan Aboriginal Land Council, and will assist in the identification of sensitive sites and enable appropriate management procedures prior to any disturbance. It is anticipated that the study will be completed in early 1996 and will demonstrate the most appropriate means to conserve Aboriginal heritage within the study area.

European Heritage: The rural area is rich in European heritage resources and is now characterised by modest townships and villages whose existence arose and still relies largely on transportation networks and the agricultural productivity of the land. There is much interest in the heritage of the area as it contributes to the visual environment and rural character.

European heritage items consist of buildings and other structures, archaeological sites and landscape items. The Heritage Schedule of the Hornsby Shire LEP lists 90 heritage items within the study area (Part 1 - Appendix E).

In order to continually update the identification and appropriate management of the heritage resources in the area, Council is undertaking a Heritage Review, including the assessment of the potential heritage items identified as part of this study. The review of the heritage schedule is an ongoing, regular process to ensure the management of heritage items is appropriate. The Heritage Review should examine the relevance of the heritage provisions to the rural area to ensure the appropriate management of heritage within the Shire.

As part of this study the following items, which are not currently on the heritage schedule, were identified as being of potential heritage significance;

- * **Tunks Bridge, Galston Gorge**
- * **Sandstone well/soak, Singleton Road, Wisemans Ferry**

- * **Boat Building Sites Laughtondale (potential archaeological site)**
- * **Stone Walls, Between Lots 2 & 3 DP 227732, Arcadia Road, Galston**
- * **Grave, Bloodwood Road, Fiddletown**
- * **Old Government Wharf, Crosslands Road, Galston**
- * **Convict built road, rear of Lot 180 DP 752048, Calabash Bay**
- * **Stone walls, Lot 10 DP 249629, Fagans Road, Galston**
- * **Slab cottage, 2 Crosslands Road, Galston**
- * **Cottage, 61 Knights Road, Galston**
- * **Cottage 15 Cobah Road, Arcadia.**

It is recommended that these be assessed for inclusion in the heritage schedule of the Hornsby Shire LEP as part of the Heritage Review currently being undertaken by Council.

The village of Wisemans Ferry was originally identified in the Heritage Study as being of significance because of its history and setting. To protect this significance it is appropriate that both Hornsby and Baulkham Hills Councils prepare a Development Control Plan to guide future development in the area. This plan would support the recommendations contained in the recently exhibited Wisemans Ferry Study and would have particular regard to both the heritage and scenic values of the area.

The main threat to European heritage items in the rural area is demolition. This is largely as a result of the desire of property owners to build new larger dwellings and the desire to use heritage buildings for commercial/business uses.

The use of heritage buildings for other compatible commercial and business uses would generally not adversely affect the heritage significance of the buildings and in many cases would provide for the ongoing use and retention of the buildings. However, careful consideration needs to be given to the proposed use in relation to the location and significance of the building.

Providing the opportunity to allow additional dwellings on sites of heritage items would have a minimal impact on the aesthetic appearance and infrastructure of the area due to the relatively small number of dwellings affected by a heritage listing in the rural area. In addition, the introduction of a broader range of uses to be permissible in the heritage buildings would provide opportunity for their ongoing use and retention and would have a negligible affect on the surrounding business areas. Management

strategies would need to be implemented however, to ensure that the use is compatible with the heritage significance of the item and the amenity of the surrounding area. Accordingly, it is recommended that the Hornsby Shire LEP be amended to include provisions relating to heritage items to provide for:

- a) a second dwelling on heritage listed properties where the heritage significance of the item and its setting will not be adversely affected; and
- b) flexible uses to occur in heritage items where the heritage significance of the item and its setting, and the character and amenity of the area will not be adversely affected.

In addition, elements should be included in a DCP to provide for specific guidelines to supplement the provisions of the LEP. The DCP should also refer proponents to the Heritage DCP.

Objective Three: To investigate the role of agriculture and other rural pursuits.

Agriculture is paramount for the day to day needs of the broader community. Hornsby Shire has a rich agricultural heritage and today agricultural production contributes an estimated \$98 million per annum to the economy of the study area and contributes to local employment. The main contributors to the value of production are wholesale nurseries, cut-flowers, stone and citrus fruit and vegetables.

Agricultural production is an important element in the visual appearance and character of the area, which in turn is an attraction to visitors. Agriculture also provides permanent and part time employment to residents of the region including a wide range of employment opportunities for a broad range of qualifications and skill levels. The opportunities for part time employment provided by agriculture particularly benefit the young adult age group who comprise a large proportion of the population.

The importance of agricultural production is recognised in the objectives of the Environmental Planning and Assessment Act, 1979, which encourage the "proper management, development and conservation of agricultural land". The importance of agriculture is also recognised in Issues 4 and 5 of the Rural Lands Study Sub-Committee report, which state:

"The Rural Lands Study should aim to identify land suitable for agriculture in the district and plan for the retention of its potential."

"Agricultural activities should have precedence and be encouraged in the district taking into account appropriate environmental, social, visual and statutory guidelines."

Suggestion that any planning scheme for the Rural Lands incorporate a guideline document that sets out the criteria to be met for agricultural activity."

The retention of a broad range of agricultural activities in Hornsby Shire generates a wide range of benefits. The major benefits are the provision of fresh food products, the contribution to the local economy and the maintenance of agricultural landscapes. Agriculture can also act as a buffer for the urban expansion of the Sydney

region and act to improve the water quality in the Hawkesbury River and its tributaries.

Hornsby Shire is typified by an urban spine along the ridge between Epping and Brooklyn on the Hawkesbury River, and a vast amount of agricultural and bushland landscapes in the rural area between Dural and Wisemans Ferry. The rural areas within the Shire are recognised as benefiting the broader community by providing a range of characters within the Sydney region and more specifically, Hornsby Shire. The Rural Lands Sub-committee recognised the importance of the visual quality of the rural lands in issue 7 of its report which recognises the "obvious presence of rural activities" as one of the valued visual qualities of the area.

The maintenance of agricultural activity within the study area has the potential for long term protection of the water quality of the Hawkesbury River and its tributaries. The planning report demonstrated that agriculture and rural environments are a more sustainable catchment land use than urban development or rural residential development as agriculture does not generate the substantial need for effluent disposal and runoff controls. Properly managed, sustainable agriculture can minimise the impacts on water quality in surrounding watercourses, tributaries and the river system.

The major threat to the continuation of agriculture in Hornsby Shire derives from the pressure created by the growth of urban and rural residential development within the Region. This pressure leads to more specific threats to agriculture within the Shire including:

- * fragmentation of agricultural land and changing land use patterns as a result of the trend towards rural residential living;
- * uncertainty about the future use of the land for agriculture; and
- * the relatively high value placed on the land.

In recognition of the benefits of agriculture and to minimise the pressures on agricultural land use, agriculture should be recognised as a legitimate constraint to urban and rural residential development. The implications of changes in land use patterns, particularly any reduction in agricultural land, should therefore be considered in the preparation of planning strategies for the Shire.

As with other land uses, it is appropriate that agricultural production be considered in terms of

Ecologically Sustainable Development A variation on ESD, related to agricultural production and known as Sustainable Agriculture, has been developed by the Australian Agricultural Council, and is defined as:

"the uses of farming practices and systems which maintain or enhance:

- *the economic viability of agricultural production;*
- *the natural resource base; and*
- *other ecosystems which are influenced by agricultural activities."* (Australian Agricultural Council, 1991)

The five principles for sustainable agriculture are:

- * farm productivity is sustained or enhanced over the long term;
- * adverse impacts on the natural resource base of agriculture and associated ecosystems are ameliorated, minimised or avoided;
- * residues resulting from the use of chemicals in agriculture are minimised;
- * the net social benefit derived from agriculture is maximised; and
- * farming systems are sufficiently flexible to manage risks associated with the vagaries of climate and markets (Australian Agricultural Council, 1991).

The definition and principles for sustainable agriculture are aimed at farm management practices, it being the farmer's responsibility to maintain and sustain the viability of agricultural production on the property. The role for Hornsby Council in sustainable agriculture is one of preserving areas suitable for agricultural production and encouraging agricultural production in those areas through appropriate planning controls.

NSW Agriculture's Policy to retain agricultural land, advocates that environmental planning policy for Local Government Areas and Regions should:

- * consider the agricultural productivity and suitability of the land and the nature and requirements of agricultural industries in the area being considered;
- * promote the continued use of agricultural and for agricultural purposes, where that form of land use is sustainable in the long term;
- * avoid land use conflicts;

- * protect water resources for commercial, recreational, environmental and agricultural uses;
- * deregulate development consent procedures for agricultural land subdivision and transfer, where continued agricultural use of the land is to occur;
- * provide a diversity of rural living opportunities in appropriate locations to provide scope for development in rural areas; and
- * retain capacity to effectively cater for specialised agricultural developments.

The location of the traditional in-ground agricultural activities of cropping and grazing is dependent upon the soil capability. However, above-ground activities, such as hydroponics, poultry farming and the growing of nursery plants in pots, are not as dependent upon land capability. To preserve in-ground agricultural activities, it is necessary to retain suitable lands and not to sterilise areas through incompatible development, fragmentation of viable agricultural land, inappropriate subdivision standards and other planning controls.

The Planning Report identified lands within the study area as either having a Class 2, 3, 4 or 5 agricultural classification. Agricultural classification is a method used for estimating the suitability of land for agricultural production based on the potential productivity of the land in the relevant social and economic context. Land with a Class 2 agricultural classification is recognised as being of superior quality, although they are of limited extent within the study area. These lands are worthy of protection because of their state and regional importance for agricultural production. Within the study area, Class 2 lands occur as isolated small outcrops along the ridges between Glenhaven, Glenorie and Galston. Parts of the floodplain at Wisemans Ferry are also mapped as Class 2 lands. The Class 2 lands in the south of the study area also coincide with the Type 2 visual character type which have been identified as being of regional significance. To ensure sustainable agriculture, it would be appropriate to introduce a zoning that reflects the importance of these lands and include land use controls that protect agriculture from competing land uses.

The extensive occurrence of class 3 lands within the study area results in the majority of agricultural production occurring on these lands. Class 3 lands are important for agriculture production within the study area and to ensure

that agricultural productivity is sustained or enhanced over the long term and to maximise the social benefit of agriculture, these lands should be preserved for agricultural production and not alienated or fragmented.

Class 4 lands are of limited extent, with the largest occurrence being at Canoelands and south of Galston Village. The Class 4 lands at both locations are used for the growing of stone and citrus fruits, despite the classification generally not being suitable for cultivation. Consequently, Class 4 classifications should also be evaluated for their potential through an examination of existing land use patterns. Accordingly, where lands of a lower class are currently sustaining agricultural production, these lands should be recognised as contributing to sustainable agriculture.

The Class 5 lands generally coincide with those lands previously identified as being sensitive lands which are unsuitable for rural or urban land use. These lands are proposed to be zoned Environmental Protection B (River Catchment).

Agricultural activities in close proximity to rural residential development can often generate conflict due to the potential incompatibility. Agriculture can affect adjoining rural lots which are used essentially for residential purposes. Similarly, the presence of rural lots can create an adverse influence on the continued operation of agricultural activities. This rural/agricultural conflict can arise when there is no separation between incompatible uses, and when there is no clear direction in the purpose and character of a district. Land use conflicts can arise from issues including noise, odour, chemicals, light, visual amenity, domestic pets, stock damage and weed infestation. When considering this conflict, it is appropriate to note that agriculture is a dynamic activity utilising a range of practices and equipment commonly unfamiliar to non rural people.

The notion of a rural lifestyle is engendered by an association with the pleasant character of the landscape rather than the potentially intrusive elements and operations which are the reality in agricultural areas. It is evident that the expectations of new residents in a rural area may not match the reality of living in an agricultural zone. Acknowledged standards in other contexts, whether they be for visual amenity, noise, odour or traffic, may be in conflict with the necessary activities undertaken in agricultural areas. Very simple adjustments to physical layout, separation,

time of operation and planning control, combined with greater community awareness of agricultural land use practices would enable many of the land use conflicts to be resolved, if not avoided. Equally the reality of living in an agricultural zone should be acknowledged through appropriate zoning mechanisms and strategies which provide clear direction to the existing and future residents.

Planning for agricultural production is a complex issue including factors such as landuse conflicts, lot sizes, land use, land suitability and other related issues. The size of allotments within the rural area is perhaps one of the most important factors in seeking to retain agricultural production as a viable land use. This applies to both individual sites for agricultural production and the sizes of surrounding lots and consequent population densities. To promote agricultural production as a viable land use, it is appropriate to prevent the further fragmentation of existing or potentially productive agricultural land.

When planning for agriculture production, the compatibility of the surrounding land use should also be considered. It is the surrounding land use which will contribute to the generation of conflicts discussed previously. Care should be taken not to exacerbate conflicts between land use. Similarly, care should be taken to identify the very elements of agriculture that produce the "rural environment" and to ensure a clear direction for existing and future residents.

To facilitate sustainable agricultural production within the Shire, it is appropriate to include zoning provisions which reflect the suitability of the lands for agricultural production and the visual qualities associated with agricultural production. Lands classified as Class 2 or 3, or other lands currently sustaining or capable of sustaining agriculture should be recognised by their nomination as "agricultural landscape zones". As a matter of principle, the potential agricultural viability of these areas should be maintained by preventing their further fragmentation.

Land uses

As part of the review it is necessary to consider the permissibility of agricultural activities and the affect of other relevant land uses on agriculture. The following discussion examines the land use definitions relevant to agriculture in the study area.

Aquaculture: Aquaculture is defined under the HSLEP as including the cultivation of living resources of the sea or inland waters. The use is permissible within rural properties and there is no reason to alter the provisions relating to aquaculture.

Agriculture: Under the HSLEP, the existing definition of agriculture is all encompassing and covers a broad range of agricultural activities including the grazing of animals, flower and vegetable growing, orchards, poultry and wholesale nurseries. Agriculture does not currently require development consent in the rural zones, except where it involves the clearing of trees or bushland. This allows agricultural pursuits to be undertaken with a minimum of regulation, although relies on environmental safeguards being installed based on the farmer's judgement.

In recent years there has been concern over the impact of agricultural activities on the environment (soil erosion, high nutrient runoff) and adjacent properties (noise, odour, visual and runoff pollution). To overcome these problems, a number of recent planning instruments have substituted the broader definition of agriculture with more specific definitions and require development consent for intensive forms of agriculture. For example:

- * the Wingecarribee LEP 1989 (Amendment No. 2) requires that the following agricultural activities require development consent: dog breeding or boarding, lot feeding of livestock, pig keeping and poultry farming within the Environmental Protection (Landscape Conservation) zone.
- * the Wagga Wagga Rural LEP 1991 replaces the definition of agriculture with definitions for intensive agricultural pursuits and intensive livestock keeping establishments, although agriculture is still listed in the land use table. Under the Plan, agriculture, other than an intensive livestock keeping establishments, does not require development consent.
- * the Draft Wollondilly LEP 1991 (Amendment No. 11) defines agriculture as including intensive agriculture, intensive horticulture, intensive livestock keeping establishments and turf farming. Definitions have been included for each of these uses as well as cattle feedlots. Each of the various agricultural uses require development consent

with the exception of intensive agriculture (grazing).

- * the draft SREP No. 20 - Hawkesbury Nepean River (Amendment No. 2) proposes the introduction of definitions for intensive horticulture establishments and intensive livestock keeping. The Department of Urban Affairs and Planning has proposed that applications for these uses should be referred to the Hawkesbury Nepean Catchment Management Trust for comment prior to the determination of the application by Council.

The introduction of separate definitions allows agricultural activities of different intensity and impact to be managed in different ways. For example, development consent may be required for intensive forms of agriculture but not for extensive agriculture. This is similar to other land use controls, where development which has minimal impact does not require development consent, whereas more intensive development does require development consent. Accordingly, to distinguish between the various levels and impacts of agriculture, it is appropriate that definitions be introduced to the HSLEP as follows:

- * Agriculture - including extensive horticulture and grazing
- Intensive agriculture - including intensive horticulture and intensive livestock keeping

Clearing: As noted, the need for consent for removal/clearing/destruction of vegetation/bushland associated with agriculture is currently incorporated in the HSLEP. With the creation of separate definitions for different agricultural activities, it would be appropriate that land clearing be defined as a separate use and provision be incorporated into the land use tables as requiring development consent.

Agricultural structures: Agriculture structures include farm sheds, barns, silos, greenhouses and glasshouses associated with agricultural production. These structures do not currently require consent, however they have the potential to impact upon the visual amenity of an area depending upon the location, size and materials of the structure. Large agricultural structures, with a floor area greater than 200m² and/or have a height greater than 5.0m from natural ground level, have the potential to impact on the visual environment and amenity of adjacent residents. It would be appropriate that these structures require development consent and that controls on

location, materials, and colours be incorporated into a DCP. To assist the consent process, the submission of a combined development/building application should be permitted.

Smaller agricultural structures (less than 200m² in area and less than 5.0m in height) would still require building approval and it would be appropriate to introduce a Local Approvals Policy to provide guidelines on the location, materials and colours of these structures.

A consequential amendment to State Environmental Planning Policy No. 4 - Development Without Consent, should be included in a draft LEP to allow Council to require development consent for large agricultural structures.

Rural structures: Similar to agricultural structure, sheds and other structures built for non-agricultural purposes have the potential to impact upon the visual environment of the area. These structures are used for storage, hobbies and home occupations. To enable the visual impact of these structures to be assessed, it would be appropriate to require development consent for structures with a gross floor area greater than 50m² or a height greater than 5m.

Dams: Dams for agricultural and non-agricultural purposes require development consent under the HSLEP and controls are detailed in the Rural Lands (interim) DCP. It is appropriate to retain these provisions given the community concern about illegal extractive industries, impact on groundwater and vegetation, poor construction techniques and the incorrect location of structures. Additionally, structures on watercourses require the consent of the Department of Land and Water Resources.

Rural workers' dwelling: 'Rural workers' dwellings are currently defined as moveable dwellings with a maximum floorspace of 110m² which may be erected where there is a genuine need or a rural worker on that land. The erection of a rural workers' dwelling on a property is an incentive for maintaining agricultural production on a property. The existing provisions were reviewed by Council during the preparation of the study in conjunction with the preparation of the HSLEP. The existing requirement to obtain development consent should be retained. Similarly, the controls in the Rural Lands (Interim) DCP should be incorporated into any subsequent DCP.

Roadside stalls: Roadside stalls are currently defined as small temporary structures in which produce grown on the property is sold. It is appropriate to retain this definition as it provides an outlet for farm produce, without being a shop which should be located within commercial centres. The Rural Lands (Interim) DCP incorporates guidelines for construction, parking and food handling which should be incorporated into any subsequent DCP.

Retail plant nurseries: Retail plant nurseries are not currently permitted to establish within the rural zones, apart from those previously approved, as the main use is of a commercial or retail nature, rather than the growing of plants. This use also has the potential to cause visual disruption owing to the preference to establish on main roads. New retail plant nurseries are more suited to the business zones where parking, access, water quality, restaurants, shops, acoustic and visual impacts are more easily managed.

Animal establishments: Animal establishments are currently defined as being a place used for the breeding, boarding, training, keeping or caring of animals for commercial purposes (including riding schools, veterinary hospitals, cat and dog kennels). It would be appropriate to revise the current definition as it does not provide a clear distinction with agriculture, which includes "the keeping or breeding of livestock, bees or poultry and other birds for commercial purposes". Further, veterinary hospitals are separately defined in the HSLEP and there is no need to include that use as an animal establishment.

A revised definition should reflect the characteristics of an animal establishment. An animal establishment is characterised by the intensive keeping of non-livestock animals, often in buildings, the importation of feed and the commercial use. The distinction with agriculture could be made clearer by renaming the use to "animal boarding or training establishments".

The implementation of the above issues is further discussed under Objectives No's. 6 and 7.

Objective Four: To provide direction for population growth, housing opportunities and commercial activities.

The Planning Study and the discussion on the previous objectives demonstrates the environmental sensitivity of the study area, the importance of agriculture and the need to provide for the orderly development of lands. One of the objectives of the Environmental Planning and Assessment Act, 1979, is "the promotion of the orderly and economic use and development of land". To achieve orderly development requires satisfying not only the environmental qualities of the area, but also the efficient and effective use of land to meet the needs of the local and wider community. Equally, economic development will improve local business activity and the welfare of both individual business proprietors and the broader community through improved access to services and facilities. As part of the strategy, it is necessary to provide direction for population growth, housing opportunities, business centres, tourism and industrial activities.

Population

The study area is currently characterised by low population densities, although more concentrated population densities occur in the Village areas. Population growth has been constrained by the land capability, provision of infrastructure and planning controls. In terms of planning controls, the HSLEP limits population growth by subdivision standards and prohibiting the erection of multiple dwellings on properties. In developing a strategy for the rural areas, it is necessary to consider the dynamics of the existing population and the opportunities for future population growth.

The need to consider the future population is also recognised in Issue 14 of the Rural Lands Study Sub-Committee report, which states:

"The Sub-Committee believes that Council should institute planning controls that will ensure that population increase does not have any marked impact.

As a general guide, the members of the Sub-Committee volunteered a maximum percentage increase on the current population of the rural lands, which they believed would retain the elements and character of the district, which they value. The percentage increases varied from 0% to a maximum of 25%, the average of about

10% from the 11 people attending (these were "off the top of the head").

In addition, the impacts of population relates to: how this population is distributed within the rural area; lifestyles; environmental impacts."

The population profile of the study area indicates a "mature" population consisting of a majority of established families, with young adults and some households of young working adults. The population of the study area has increased gradually over the past 25 years, with significant increases in the late 1970's being attributed to the development of the villages of Galston and Glenorie. It is likely that a very gradual population growth will continue without variation to existing planning controls. Continual expansion of this population is likely through limited infill development in the Village areas, further subdivision of rural properties and the subdivision of Crown land on the northern periphery of Glenorie, Arcadia, Fiddletown and Berilee.

The 1991 population distribution indicates a high proportion of the population aged 15 to 19 and 40 to 50. Having been 4 years since the last census, these age groups would now be evident in population profiles as peaks in the early 20's and mid 40 to 50 age groups. Over the next 20 years it can be anticipated that the population in the older groups will increase as the lower age groups are not supplemented by younger families with children. The housing needs associated with these age groups will be discussed later in this objective and the community needs discussed in objective 5 of this strategy.

The population size and profile that will be in existence within the study area at the 20 year planning horizon is dependent upon the existing population, changes to planning controls and existing population trends and profiles. In considering population growth strategies and amendments to planning provisions, it is necessary to consider the constraints of the area, the impact of additional persons, the likely changes in population profile and additional demands for community facilities and infrastructure.

The discussion in the previous three strategy objectives has highlighted the following constraints to development in the area:

- * the adoption of the precautionary principle of ESD, where any proposal will have an adverse impact on water quality, or the impact cannot be scientifically and/or satisfactorily resolved, the proposal should not proceed;
- * areas of poor land capability are not suitable for urban or rural development;
- * flora and fauna habitats should be preserved to maintain communities, fauna movement and biodiversity;
- * areas adjacent to bushland are subject to a high bushfire threat and are not suitable for development which concentrates human activity or which may be difficult to evacuate;
- * the natural features and rural land use contributes to the area's character and appeal;
- * the conservation of Aboriginal and European heritage is important for future generations; and
- * agriculture potential should be preserved as it is important to the economy, employment and visual character of the area.

Further constraints to development within the area include infrastructure and the transport network. The main constraints are the limited supply of town water to service additional properties and the need for appropriate means of effluent disposal that do not impact upon water quality. Population increases would also place additional demands on community and recreation facilities and local and regional transport networks which are constrained by limited access to and from the study area.

A number of studies in recent years have recognised the desire of many people to escape the city and relocate to rural areas. This reflects aspirations for an improved lifestyle and the perception for an improved quality of life in rural areas. the attractiveness of rural and semi-rural lifestyles since the 1960's parallels growing middle class affluence, increases in personal mobility, shorter and more flexible working weeks and an ageing population with retirement ambitions (Wellings, Smith and Byrnes, 1985).

The Department of Planning's Rural Lands Evaluation Manual notes that rural residential demand significantly declines beyond about 20 minutes travelling time from the nearest urban centre. This assumption is largely supported by other rural land studies carried out in the state. It is therefore reasonable to assume that the greatest demand for rural residential living in

the study area is likely to be on the urban fringe in areas which provide the shortest travel times to suburban services and the place of work. Much of Hornsby Shire's rural lands would meet this criteria and will be subject to increasing pressures for rural residential living. These pressures are likely to diminish in the more remote northern rural areas of the Shire. The demand for rural residential land should be considered legitimate only where persons are seeking rural land for an alternative lifestyle rather than speculative purposes. Problems associated with speculative subdivision include;

- * price spirals and restriction in supply for genuine consumers;
- * costs of providing underutilised public services; and
- * degradation of agricultural land (Wellings, Smith and Byrnes, 1985).

The demand for rural residential and urban encroachment should be resisted where inadequate or insufficient infrastructure is apparent and where natural environments and existing or potentially productive agricultural land may be prejudiced.

The Department of Planning's publication "Cities into the 21st Century" provides a policy framework for determining the implications of population growth within the Sydney Region and within Hornsby Shire. The document provides a planning framework for the future population of the Sydney Region and the means to accommodate population growth and demographic trends. The strategy adopts a principle of more compact cities and an ecologically sustainable region. The strategic principles of the strategy include:

- * controlling the location, scale and character of urban expansion and urban support activities so that impacts on the environmental quality of the region are minimised;
- * to control the encroachment of urban and rural residential development into rural areas so that agriculture is not unnecessarily replaced, recreational and tourism resources are retained and valuable habitats are protected.

While the Cities for the 21st Century strategy does not explicitly indicate population growth distributions, there is an emphasis on the "compact city" strategy, combined with a recognition of the benefits of preserving

agricultural potential and recognising the environmental limitations of fringe areas. Accordingly, any necessary population growth within the Hornsby Shire would most appropriately be accommodated within the existing urban areas or areas immediately adjoining existing urban areas.

Future population growth should not occur in areas of poor land capability or good agricultural production or areas which cannot be serviced or where development may impact upon water quality. Consequently, there are limited opportunities for additional population growth in the rural lands and a policy of constrained population growth is appropriate for the study area. Where population profiles indicate a demand for additional housing, a preferable strategy would concentrate additional persons within and adjacent to the existing Villages which are discrete, can be better serviced and the impacts associated with development can be appropriately managed.

Housing opportunities

The range of existing allotment sizes, age of dwellings and current planning provisions within the rural area already provides diverse housing opportunities and a large variation in property styles, values and affordability. Given the strategy of limited population growth it is unlikely that additional housing opportunities will be required. However, the population profiles demonstrate a short and long term need for housing suited to the older age categories which are likely to increase as a proportion of the population. There is also a more immediate need for appropriate and affordable housing for the young adult age group who comprise a disproportionately high percentage of the population and are likely to be seeking their own accommodation over the next few years.

These two age groups have similar housing needs. The elderly often seek to sell their rural property and buy a more easily maintained smaller property. Similarly, young adults seek to move out of the family property into something that is more affordable. To retain the elderly and young adult populations within the study area, their needs for housing should be satisfied. Accordingly, opportunities for different styles of housing within or adjacent to the Village areas should be pursued to encourage and promote a wider choice of housing types.

The preceding discussion on the strategy objectives has identified the Village areas as the most appropriate locations for the provision of alternative forms of housing to suite the needs of the population profile.

Of the Village areas, Galston Village is the most capable of supporting additional residential development through a northwards extension of the Residential zoning to School Road. This extension would permit further accommodation and therefore opportunity for additional housing for the aged and young adults. The extension has the benefit of being within the same catchment as the existing village, allowing water quality impacts to be concentrated and appropriately managed.

Commercial Activities

The retail environment within the study area is part of a broader network of business activities and is influenced by the wider commercial environment. The planning report identifies the expected predominance of retailing activities within the commercial precincts consistent with a local role and function. The retail analysis and overview of market conditions indicates that the retailing activities are performing at a level consistent with their potential. Limited population growth within the area will restrict the potential expansion of retail and commercial centres within the study area, although some expansion could be accommodated based on an increase in retail expenditure capture rates. The planning report indicated that an expansion of up to 25% or 1,500m² on existing retail space could occur, unless particular retail innovations demonstrate otherwise.

Given the limited population growth, the role of each centre is unlikely to change in the future. The proposed expansion of Galston Commercial Centre would increase existing floorspace, however the constraints posed by location and limited population growth would retain the centre's role as a local one. Galston Commercial Centre lacks integration and should be rationalised to provide a more appropriate and attractive shopping area. Particular emphasis should be placed on good design and the ability of any proposal to integrate with the existing centre.

A DCP should be prepared and include a masterplan for the centre reflecting various themes including:

- * the rationalisation of car parking areas;

- * the provision of a village green;
- * development opportunities for new and or relocated retail and commercial facilities; and
- * rationalisation of ingress and egress points.

These proposals would achieve a better layout of the centre providing more convenience for customer and improved efficiency in centre management. However, this will require considerable co-ordination and co-operation between land owners and retailers. Council co-ordination and encouragement would be a critical factor in the success of the scheme.

Other centres are expected to continue their role and function in the current hierarchy of business centres throughout the study area and retain their current trading patterns.

Tourism is one of Australia's fastest growing and economically important industries. Although there are no figures relating to the study area specifically, it is estimated that the Shire attracts over one million visitors per year, contributing approximately \$29 million to the local economy. Tourism can contribute to the local economy through expenditure by visitors and the subsequent multiplier effect which ultimately affects all sectors of the community. The attractions within the study area which draw tourists are a combination of both natural and man made resources which together create a distinct rural character. This atmosphere extends beyond the limits of the study area as it falls within the broader catchment of the Hawkesbury region.

The planning report identified further potential to increase tourism and thus expenditure within the study area, by strengthening the tourist infrastructure and accommodation facilities. The report also identified a need to establish relevant controls for tourism development to ensure that they do not compromise the natural environment and character which are the attractions for visitors.

The level of tourism is also recognised in issue 11 of the rural lands study sub-committee report which states:

"Tourism should be based on the qualities of the district. It should be diffused, low key, rather than high impact and "event" generated. A tourism industry should not destroy the inherent qualities of the rural district that create the initial attraction."

The study area could better realise its tourist potential through increasing its exposure, presentation and access to facilities. Improved signs, avenue tree planting along main thoroughfares, upgrading of the business centres and improved facilities for bushwalkers and picnickers would improve the tourist potential of the area.

The Fagan Park Rotary Spring Festival is the only annual event conducted in the study area which involves a large sector of the public. There is potential to increase annual festivals to generate further interest in the area. The Hornsby Shire Tourism Plan identified possibilities including: Spring in the hills, community walks, cycle races, and horse events. Council could initiate these events and involve relevant local community groups and businesses to further promote interest in the area. The popularity of Fagan Park could also be increased by attracting regular events and promoting the Park as a function centre.

There is scope to improve the sign posting for tourist facilities in the study area to include directions and information about the destination points. Similarly, thematic trails could be developed and linked to other points of interest including Fagan Park, the model railway, or services such as Galston Village. Council is currently preparing a tourist trail which will link the nurseries and gardens together. There is scope to produce a Hawkesbury River region tourist trail including attractions from the Hornsby, Baulkham Hills and Hawkesbury Council areas.

The planning report and the Hornsby Shire Local Tourism Plan identified overnight accommodation opportunities including:

- * bed and breakfast;
- * farmstay;
- * ecotourism;
- * self contained cabins;
- * guesthouse accommodation; and
- * back packers' hostel accommodation.

In general terms, overnight visitors spend over double the amount the day trippers are inclined to spend. Accordingly, it would be beneficial to the local economy to increase the amount of overnight accommodation within the study area. The provision of such accommodation would have to be balanced against the possible negative social and environmental impacts of tourism through establishing relevant controls and assessment criteria.

Guesthouse, farmstay and bed and breakfast accommodation usually utilise existing buildings and structures and therefore have a minimal physical and visual impact on the environment. Similarly, their low scale and low intensity use is more consistent with the social environment of the study area. For this reason, this type of accommodation is particularly suitable within the area. This is partly evidenced by the existing number of guest houses and bed and breakfast activities currently operating on an informal basis in the rural area, proving both a demand for this type of accommodation and the low intensity of the use. These uses should be promoted on a low scale, low intensity basis throughout the study area to increase the area's exposure to the tourist economy. Accordingly, the land use table for the rural zones should include provision for bed and breakfast accommodation, farmstay accommodation and ecotourism facilities. Similarly, the environmental protection tourist zones in the Wisemans Ferry area should be retained to facilitate appropriate forms of low scale tourism development in the Hawkesbury River region. Controls should also be included in a DCP to ensure that the potential social and environmental impacts of tourist facilities are mitigated.

There is currently no land zoned for industrial purposes within the study area, although the Dural Service Centre permits service and light industrial activities and extractive industries are permitted throughout the rural zones. The need for additional industrial activities in the area is also addressed in Issue 6 of the Rural Lands Sub-Committee report, which states:

"we do not believe that substantial industrial activity is appropriate in the area".

The Dural Service Centre provides adequate serviced industrial land within the study area and further industrial zones are not warranted. Rather the existing controls relating to rural and home industries should be reviewed. Rural and home industries provide a source of employment within the rural area and can currently be undertaken in both the rural zones. Rural industries are those industries associated with primary products derived from the local area. Home industries are those activities undertaken within a 50m² building on rural properties. Whilst the economic value of these activities cannot be easily determined, it is acknowledged that they provide both a source of employment along with a contribution to the local economy. Such benefits

should be balanced against the amenity and environmental impacts, and the implications on the vitality of business and service centres in the area.

The size of rural properties can allow small businesses to be concealed from adjoining neighbours and to not effect the amenity of the area. Equally, these small businesses do not have the impacts associated with land clearing, infrastructure demands, water quality issues and impacts on business centre hierarchies. However, many of the businesses which initially commence as small operations have grown to the extent that they have potential to affect the natural environment and business centre hierarchy, along with placing additional demands on infrastructure. Accordingly, it is appropriate that an upper limit be set for these activities which recognises the employment and economic benefits, although avoids the associated impacts on the environment, business hierarchy and infrastructure.

Field trips undertaken during the preparation of this study indicate that a maximum floor area of 200m² and 3 employees would be a reasonable, although arbitrary, upper limit for this style of development. It is acknowledged that where an activity would exceed these parameters, it would be most appropriately located within the Dural Service Centre, where appropriate infrastructure is provided and consistent with community expectations.

Objective Five: To identify and respond to the needs of the community.

The planning report identified existing and future community, recreation and transport needs on the basis of demographic trends, existing services and facilities and community preferences. One of the objects of the Environmental Planning and Assessment Act, 1979 is "to encourage the provision and co-ordination of community services and facilities." Findings from the planning report provide the framework for the preparation of a planning strategy that is responsive to these needs and fulfils the object of the Act.

The needs of the community are also recognised in Issue 8 of the Rural Lands Study Sub-Committee report, which states:

"The Local Community

Part of the essential character of the district is its broad-based socio-economic nature. Future planning should recognise the nature of the community and aim to encourage the maintenance of this diversity.

Community Services and Facilities

Any strategy for community services and facilities needs to consider the availability and adequacy of services and facilities, not only for the wider community but also the portions of the community with the greatest needs. The following assessment provides an evaluation of overall community needs and then focuses on strategies to meet the needs and preferences of the two groups with the greatest needs, namely the aged and young.

Community Facilities for the Wider Community: The adequacy of existing community facilities within the study area, including halls and meeting rooms, library services and schools has been assessed in the planning report on the basis of responses to community questionnaire and population concentrations and distributions.

Halls and Meeting Rooms: In relation to community halls and meeting places, the report identified the need for additional facilities within Galston and Canoelands. A regional sized community centre with a seating capacity of 500 people has been proposed for Galston. This facility would need to be located in close proximity to the Village area to avoid isolating less mobile groups of the community. A

masterplan and a suitable site for this facility are yet to be determined, although consideration could be given to the expansion of the existing hall. The existing building is a heritage item and any extension would need to be compatible with its heritage significance. This could be achieved by extending the building to the south or west where the impact would be minimised.

The establishment of a regional size community centre at Galston would have the capacity to serve the catchment of the study area and peripheral areas in Baulkham Hills. However, the report has noted that the provision of a regional community centre in Galston will not adequately service the needs of small, isolated communities in the study area. The Canoelands district is the most populous and isolated area within the study area without a local meeting hall. Accordingly, it is recommended that consideration be given to a small community meeting hall in the Canoelands area. Relevant considerations in determining this issue will include available funds and the population of the area in relation to community halls in nearby districts. In respect to the latter, a meeting hall with a capacity for 30 to 40 seated persons would be consistent with seating ratios provided in other local meeting halls in the study area.

Library facilities: Library services within the study area are limited to a small branch in Galston. This facility is supplemented by additional facilities at Round Corner, with more substantial library services available in Hornsby, Pennant Hills and Castle Hill. The current shortfall in library floorspace in the study area will be remedied, in the regional context, by the relocation of the Hornsby, Pennant Hills and Castle Hill libraries to larger premises. However, these extensions will not alleviate the needs of sections of the community that are less mobile and who will still depend on local services within the study area. Accordingly, a review of the role and function of Galston library should be undertaken following the relocation of Pennant Hills and Castle Hill Libraries.

Educational establishments: Sufficient suitably zoned land exists for additional educational establishments to be provided within the study area. However, the need for additional facilities is unlikely, given the constant numbers of persons aged 0-4 years in the study area and the limited population growth expected in the study area.

Aged Housing: The planning report noted a 2.5% increase in the over 65 age group in the

decade to the 1991 census. The increase reflects broader regional trends and will occasion an increased demand for retirement style housing options in the study area. This housing will need to be provided within close proximity to the Village centre areas due to the limited mobility of this age group, coupled with the inadequacy of public transport services in the study area.

Demand for aged housing is typically met by commercial retirement villages. However, this is unlikely within the study area, due to the shortage of vacant land zoned for residential purposes within the Village areas. Accordingly, any housing strategy needs to provide additional land in proximity to the Village areas that can accommodate retirement style housing. Similarly, housing suited to the needs of aged persons should provide easily maintained properties and single level homes. In conjunction with the need for additional aged housing there will be an increased demand for medical services. These services can be provided in the commercial and rural zones.

Youth Facilities: In the residents' survey distributed as part of the study there was a high response indicating a need for additional youth facilities. The Planning Report provided an assessment of the availability of youth facilities in the study area and concurred with the findings from the questionnaire. To mitigate this shortage, the report considered the provision of additional social/meeting facilities in the study area including youth centres, low cost restaurants and coffee shop/cafes to cater for teenagers. It is anticipated that there will continue to be a high demand for these type of facilities for at least the next five to ten years. The shortage of youth facilities is particularly apparent in the study area which has the highest proportion of persons in the 0-19 years age group throughout the Shire.

On a district basis, the Galston and Middle Dural areas have the highest proportion of persons aged 0-19 years (35%) followed by Dural (24%), Arcadia/Berrilee (20%), Glenorie (11.7%), Canoelands (7%), and Wisemans Ferry (2.3%). The distribution of persons aged 0-19 years are concentrated within the southern portions of the study area with the Galston district the most heavily populated. Galston is central to the other southern districts and would be the most suitable location for additional youth facilities and services.

Youth facilities can be supplied through a number of means including Council provided facilities

and private commercial interests. In respect to the latter, the future expansion and rationalisation of the Galston commercial area will provide opportunity for additional restaurants and coffee shops/cafes, if demand warrants. In addition, the introduction of a village green area would provide a significant social node for the youth of the area as well as the broader community.

Facilities that can serve youth groups include recreation and leisure oriented facilities. In Galston, the only facility that currently fulfils this role is the aquatic centre at Galston Park. This facility is located opposite Galston High School on Galston Road approximately 1km from the Village area. The advantages provided by the location of this facility, including accessibility and proximity to large numbers of persons aged 0-19 years, makes it an ideal location for the provision of additional facilities to serve younger age groups.

Appropriate uses as part of any extension would include a gymnasium and a coffee shop/cafe. While it is appropriate that any new facilities service the wider community, it is well recognised that teenagers use areas where they are independent of older age groups. Accordingly, it is recommended that consideration be given to the extension of the Galston Pool facility to provide an area that can service the social needs of teenagers.

The provision of facilities for teenagers in the northern districts of the study area are limited due to the lower numbers of persons aged 0-19 years and the wide population distribution. Consequently, community based recreation facilities will continue to provide the most viable option to meet the existing and future social needs of teenagers in these areas.

Recreation Resources

Recreation resources within the community can make a significant contribution to the community's physical, social and emotional well being. Generally, the study area is well served by recreation facilities with more than 50% of respondents to the resident survey indicating that each of the different types of recreational facilities were adequate in their area.

Open space and recreational resources need to be provided according to local, district and regional needs. In this context, the planning report provides an inventory of recreation resources in terms of the population thresholds these facilities

should support. It is noted that the nature of rural properties permits their use as recreation areas and provides opportunity for the installation of recreation facilities such as private tennis courts.

Local Open Space: Local open space facilities include neighbourhood parks and children's playgrounds. The report found a deficiency in local open space areas and facilities in the Galston, Dural and Wisemans Ferry Village areas. It recommends that the planning strategies for these areas include measures to provide these facilities.

In Galston, park and playground facilities are available at Galston Park on Galston Road. However, the park is approximately 1km from the Village area which is not easily accessible to some user groups and serves a predominantly district open space role. Accordingly, as part of any proposal to rezone land around the Village to a residential zoning, it is recommended that appropriate land be zoned as open space to provide for a neighbourhood park and playground. On the basis of the existing and likely population in the Village area, the neighbourhood park should have a minimum area of 3,000m². Provision should be included in a DCP for a masterplan to be prepared incorporating a children's playground and maximising bushland protection.

In the Dural Village area there is limited available land for the provision of the required children's playground. This is a consequence of the lineal form of the Village on either side of Old Northern Road. There is currently only one setting within the Village area fulfilling a local recreational need. This is the Porter Scenic Lookout at the northern edge of the Village core on the Baulkham Hills side of the Dural Village. This site has the benefit of being adjacent the Village Centre and having scenic amenity which combine to increase its attractiveness as a recreation area. Accordingly, it is recommended that Baulkham Hills Shire Council be requested to undertake further investigations into the provision of a childrens' playground within the lookout site. Funding for the facility could be shared between both Councils.

The provision of local recreation facilities in Wisemans Ferry can be accommodated within the existing public open space on the east of River Road fronting the Hawkesbury River. The park is in close proximity to the Village area and provides district recreation facilities in excess of the minimum requirements based on the

population catchment in the surrounding area. These resources are supplemented by additional picnicking and recreational facilities on the Baulkham Hills Shire side of the Village. As noted in Chapter 11 - Recreation Resources, Council's Parks and Landscape Team has prepared a masterplan for Wisemans Ferry parks as part of the review of the Shire's urban park system. The masterplan includes an informal village green area suitable for ball games, leisure and community events and a childrens' playground. It is recommended that the masterplan for the Wisemans Ferry Park be incorporated into a Development Control Plan.

District open space: District open space includes picnic facilities, sports fields and tennis/netball courts which serve the wider community rather than just the immediate area. The planning report found that the provision of district open space facilities throughout the study area was generally well above the adopted benchmarks. However, an evaluation of supply in relation to the total population of the study area identified a need for an additional four tennis courts and two netball/basketball courts within the rural areas. These rates are less than those identified for each district independently. This is due to the distribution of the population and existing facilities throughout the study area. In this respect, it is not economically viable to meet the demand on a district by district basis. Accordingly, the provision of the required facilities needs to be met in the context of the total study area, with facilities directed to areas with the highest demand. The following discussion will identify these areas, the extent of new facilities that can be provided and potential locations.

The report identified the Glenorie-Canoelands district as being deficient in netball/basketball facilities. On the basis of the population of the district, it is appropriate that at least one of the two courts needed in the study be provided within the district.

In recognition of its proximity to services, accessibility and population concentration, any facilities in the Canoelands-Glenorie district should be provided within the Glenorie Village area. District recreation facilities within the Village are currently provided at Glenorie Oval, situated on the Baulkham Hills Shire side of Old Northern Road. This site currently contains one cricket field, two practise nets, one soccer field and four tennis courts. To reinforce the function of the Oval, it is appropriate that a

netball/basketball court be provided within this area. Site inspections of the Oval indicate that one court could be accommodated to the west of the existing tennis courts, adjacent to the northern boundary of the Oval. Accordingly, it is recommended that Baulkham Hills Shire Council be requested to undertake further investigations into the provision of a netball/basketball court within the district Oval. Funding for the facility could be shared between both Councils.

The shortage of a tennis court in the Arcadia-Berrilee-Berowra Waters and the Middle Dural-Galston districts is mitigated to some extent by facilities provided in Dural and Glenorie. Similarly, the shortfall of a netball/basketball court in the Arcadia district is mitigated by a court in Glenorie Park and those already available at Galston.

Each of the two districts contain a district park that could accommodate additional tennis courts. In recognition of the larger population base in the Galston district and the consequent greater demand for tennis courts, it is appropriate that any tennis court facilities be provided within Galston. Residents in the Arcadia/Berrilee district would be able to utilise these facilities, or the surplus courts in Glenorie, more readily than Galston-Middle Dural district residents, because of the greater dispersion of the population in the Arcadia-Berrilee-Berowra Waters district. Accordingly, these facilities should be provided within Galston Park. While ideally, three courts should be provided, preliminary investigations indicate that a maximum of two should be provided to minimise the extent of clearing required. These courts could be located to the south of the existing netball/basketball courts or swimming pool complex.

As noted, it is intended that these facilities and those at Glenorie Park will service the demand in the Arcadia-Berrilee-Berowra Waters district. However, the provision of two courts in Galston will be exacerbated by the population increases in the Galston area as a consequence of any residential rezonings and leave a further demand for two tennis courts in the study area. The demand is greater in the area from Galston to Arcadia. In most demand are tennis, netball/basketball and picnic facilities. In this respect, a masterplan prepared for Arcadia Park by Council's Parks and Landscape Team proposed a picnic area on the disused tip site in the north of the Park. To accommodate existing and future demand, it is recommended that the masterplan be reviewed with the aim of providing an

additional netball/basketball court and one or two tennis courts on the site.

A shortfall of one tennis court within the Round Corner-Dural district was also noted. This demand will be eased with the provision of additional tennis courts in other rural districts. Additionally, the area is accessible to facilities in Cherrybrook, Glenhaven and West Pennant Hills.

Similarly, a shortfall of one netball/basketball court was identified in the Maroota-Wisemans Ferry district. However, this facility is not warranted due to the low population threshold in relation to the benchmark. Further, the proposed courts at Glenorie and Arcadia meet the collective demand for these facilities throughout the study area.

Private Recreation Facilities: Due to the generally adequate supply of public recreation facilities in the study area and the dispersed population, there is limited demand for commercial private recreation facilities. Consequently, private recreation facilities in the study area include the type of facilities that are more economical for the private sector to provide. These include a squash centre, golf driving range, pony club, motorcross track, bowling clubs and a golf course. In this context, it is appropriate that the zoning controls permit private recreation facilities as a means to supplement public facilities in areas that will not compromise the opportunities for housing or agricultural production.

Transport

The road network within the study area is consistent with traffic management principles. The road hierarchy, combined with relatively low traffic volumes, eliminates the need for a large scale traffic management programme. Traffic within the study area is provided with a high level of service on all types of roads within the study area although this is tempered by constraints in the regional road network. The traffic network will experience greater pressures through increased rural and residential development and from traffic associated with the north west sector.

Public Transport: The existing public transport system within the study area provides limited opportunities for residents to access shopping and employment centres in the study area and the surrounding region. The low level of patronage and limited potential for population growth in the

study area makes increased public transport services unlikely in the foreseeable future.

The report noted that there was a particular need for additional public transport facilities in late evening periods and on weekends to and from the Hornsby and Pennant Hills interchanges. Accordingly, it is recommended that the local bus company be advised of the findings from the resident survey and requested to undertake its own evaluation of the feasibility of additional evening and weekend services.

Pedestrian, Bicycle Routes and Horse Trails: Pedestrian movement within the rural parts of the study area is limited when compared to urban areas because of the long distances between properties, commercial, recreation and social facilities. Pedestrian movement is provided in the Village areas where the distance to facilities is less. Pedestrian and bicycle routes should follow logical routes that link destinations such as sporting facilities, playgrounds, schools and routes to adjoining areas. In this respect, the draft Hornsby Bicycle Plan (Traverse Morgan, 1988) identified a need for a formalised network of off-road cycle paths within the study area to provide links with local schools. Accordingly, it is recommended that the DCP provide for the designation of formal bicycle links between the Village areas and community, recreation and social facilities. Similarly, the report identified a need for the implementation of formal horse riding routes in the study area. Investigations should be undertaken of the potential for the establishment of horse riding trails in consultation with local horse riding clubs and equestrian establishments.

Road Network: The road network within the study area has evolved without predetermined structure or form as opposed to being a planned network. A number of roads throughout the study area, whilst illustrated on plans, are not constructed, particularly where they span creeks or gullies. Despite these paper roads not being constructed, their retention is recommended to allow for future extension and upgrading if required.

The planning report noted that car based transport will remain the main travel mode in the rural areas of Hornsby and Baulkham Hills. The report also noted that expansion of the collector and local road systems is not required in the short term. However, existing transport corridors along Arcadia, Bay and Berrilee Road have been

identified for upgrade and better delineation in the medium to long term.

The remaining roads in the study area have the capacity to accommodate greater volumes of traffic, but may require pavement, rehabilitation and improvements to the road geometry. Local area traffic management measures should be encouraged for wide local roads where unsafe situations are created by excessive speeds. The Dural Village Study (Hornsby Shire Council, 1993) recommended the construction of a roundabout at the intersection of Galston Road and Old Northern Road and the widening of Old Northern Road to a four lane dual carriageway in appropriate areas. Traffic conflicts have also been identified in the Galston Business Precinct. Accordingly, it is recommended that the DCP include measures to improve traffic flow and pedestrian safety in the Dural and Galston business areas.

Objective Six: Review the existing planning controls applying to the rural lands

In reviewing the existing planning controls that apply to the rural areas, it is necessary to first consider the existing planning framework and future planning control options before developing revised planning controls.

Existing planning framework

The planning framework that applies within the study area has been established as a consequence of the changing roles of the three levels of government in relation to the management of land uses. Local planning controls in the study area were last comprehensively reviewed in the early 1980's. In the intervening period, there have been changes in the social, economic and environmental issues affecting the study area. In recognition of these changes and to meet community aspirations, it is necessary to review the existing planning controls at the local level.

The review at the local level should complement the planning framework that has been established by upper levels of Government. The framework provided at the Federal level, primarily through the National Strategy for Ecologically Sustainable Development, and at the State level by various plans and policies, including:

- * Regional planning strategies - "Cities for the 21st Century";
- * State Environmental Planning Policies - various, as described in Appendix B;
- * Sydney Regional Environmental Plans - No. 9 Extractive Industries and No. 20 Hawkesbury Nepean River; and
- * Ministerial Directions - various, as described in Appendix B.

At a local level, the planning framework is established by the Hornsby Shire Local Environmental Plan, 1994 (HSLEP). The HSLEP controls land use within Hornsby Shire and contains a range of provisions. The incorporation of an updated planning strategy for the rural lands within the HSLEP may require consequential amendments to the Development Control Plans (DCP's) which apply to the area. The DCP's are subsidiary to the HSLEP and provide additional controls and guidelines for certain areas and types of development.

Future Planning Control Options

Planning controls within the rural areas of Hornsby Shire have historically been prescriptive. For example, the land use tables for the different zones specify what land uses are permissible and prohibited, while the subdivision standards are based on numerical standards. The Study has the option of recommending either the continuation of the existing prescriptive controls or recommending an alternative type of control. An alternative to prescriptive controls are performance based controls, which allow different land uses where objectives or performance standards are met. In determining what type of controls are appropriate, it is essential that the controls reflect community aspirations. The future planning control options are also recognised in Issues 6 and 15 of the Rural Lands Sub-Committee Report, which state:

"The present situation as set out in the LEP is considered appropriate for the Rural Areas and no substantial change is warranted. However, this should not rule out consideration of alternative proposals (that do not comply but which have an acceptable impact) through the normal Development Application process.

There must be a dynamic plan of indefinite time which is based on the philosophies and aims set out in this paper. Each five years there should be an evaluation to assess the plan's effectiveness in meeting those philosophies and aims. In the preparation of the plan, consideration should be given to the long term commitments of people. This section will consider options for the definition of agriculture, land use control, and subdivision standards."

The following discussion presents a review of existing controls and recommended land use and subdivision provisions for the various activities and regions in the study area.

Review of Planning Controls

The review of planning controls is most appropriately undertaken in the context of the village and rural areas.

Village Areas

The Villages are currently zoned Residential A (Low Density) under the HSLEP, which is the same zone that applies to the urban areas of the Shire. As a consequence, the same land uses, subdivision controls and State Government urban

consolidation policies apply equally to the village and urban areas. However, the villages have different constraints and characters to their urban counterparts, primarily as a consequence of their surroundings and service provision. The Villages are surrounded by rural areas and are not directly linked with other urban areas by land use or major transport facilities. The main differences in services are shopping and community facilities, public transport and the lack of a reticulated sewerage system.

In recognition of the different character and nature of the Villages from the urban areas of the Shire, it is appropriate to apply a separate zone that better reflects the village character. It is appropriate to retain the Residential title to the zone in acknowledgement of the semi-urban environment within the villages. Equally, in the context of a residential environment, the density of the Village areas is low. Accordingly, a title of Residential AR (Low Density - Rural Village) would be appropriate for the zone. This zone should be supplemented by appropriate objectives, zoning table and density and floorspace ratio provisions.

The Residential zoning at Galston Village should be extended north to School Road, to provide additional housing, accommodation and housing choice. Part of this area should be zoned Environmental Protection B (River Catchment) in recognition of poor land capability which would not permit urban development. As noted previously, land currently zoned Residential A at Gentlemans Halt and Singleton Road, Wisemans Ferry should be rezoned to Environmental Protection B (River Catchment) in recognition of the poor land capability.

The zoning of the property at 2 Geelans Road, Arcadia was subject to a zoning anomaly introduced by LEP No. 10 in 1985. The LEP contained a map drafting error which expanded the Residential zoning of the property beyond a strip of land adjacent to the Blacks Road frontage. The property owners have subsequently subdivided the residentially zoned land fronting Blacks Road into four allotments of 1,134m² and a residential rural allotment of 1.7ha (DA 548/93). It is appropriate that the zoning of the land be rationalised by retaining the residential zoning for the allotments fronting Blacks Road and zoning the 1.7ha allotment Rural.

The HSLEP includes structured objectives for each zone. The first objective describes the general theme and strategy for the zone; the

second details the function of the zone; and the third provides measures for the environmental conditions of the zone. The following objectives are appropriate for the Rural Village zone:

- (a) to provide for the housing needs of the population of the rural areas of Hornsby Shire;
- (b) to promote an alternative housing environment within the rural areas and allow low density dwellings and other uses compatible with a low density rural village environment; and
- (c) to provide for development that is within the environmental capacity of a low density rural village environment.

The Hornsby Shire LEP also includes structured zoning tables which list permissible and prohibited land uses. Uses currently permitted within the Residential A - Low Density zone should be transposed to the Rural Village zone, with the following exceptions:

Educational Establishments: Educational establishments typically comprise schools, TAFE colleges and adult learning facilities. Educational establishments can consume large portions of land and may compromise the housing yield expected within the Village areas. Accordingly, educational establishments should not be permitted within the rural Village areas.

Exhibition Homes: Exhibition homes are homes built for the purpose of temporarily displaying homes or home products. These homes are typically associated with urban release areas and would be inappropriate within the Rural Village zone. Accordingly, exhibition homes should not be permitted in the Rural Village zone.

Multi-unit Housing: Multi-unit housing comprises a series of dwellings erected on the one allotment of land to provide increased housing and efficient land usage. Multi-unit housing is typically associated with infill medium density housing development in urban areas where infrastructure, community facilities, transport services and recreation facilities are available. The Villages are not serviced with the facilities and infrastructure typically associated with urban areas. In particular, the Villages are not serviced by reticulated effluent disposal system which severely limits the opportunities for infill style medium density housing. Equally, the Villages are not located in a position to take advantage of transport and employment nodes and are an inappropriate location for urban consolidation

initiatives. Accordingly, it is appropriate that multi-unit housing be precluded from the Village areas although some concessional lot sizes should be considered adjacent the village core

Places of Worship: Places of worship generally comprise churches and like facilities. Similar to educational establishments, these uses require larger areas of land and if located within residential zones, can compromise the opportunity for further housing. Accordingly, places of worship should be precluded from the Rural Village zone.

Public Buildings: A public building is a building used as a business or office by public authority or an organisation established for public purposes. The construction of public buildings within the Rural Village zones would also compromise the opportunity for further housing within this zone and they should be precluded.

Tourist Uses: The discussion presented in Objective Four identified the opportunity to increase tourism potential through the introduction of overnight accommodation for visitors and travellers. The village area provides an opportunity for the introduction of low scale accommodation, such as bed and breakfast accommodation. The introduction of bed and breakfast accommodation would not prejudice the efficient usage of land in the village zone for its principal purpose, to provide housing. Other more moderate scale accommodation, such as guesthouses, would be better suited to the rural areas and should not be provided in the village areas.

Veterinary Clinics: Veterinary clinics are permissible in the surrounding rural area and the adjacent commercial zone, which combine to provide ample opportunity for the establishment of veterinary clinics within the rural area. Accordingly, their location in the Rural Village zone would be unnecessary and unwarranted and they should be precluded.

With the exclusion of the abovementioned land uses, the consequent Rural Village land use table would permit:

- bed and breakfast accommodation;
- child care centres;
- community facilities;
- dwelling houses;
- group homes;
- home occupations;
- housing for aged or differently-abled persons;

recreation areas;
recreation facilities;
special care homes; and
utility installations.

All other land uses would be prohibited.

The existing Residential A zone has a minimum allotment size of 500m², which was introduced in 1994 with the gazettal of the HSLEP. However, the majority of allotments were created prior to the introduction of the HSLEP, and were subdivided under the previous minimum allotment sizes of 690m² for street frontage allotments and 950m² for battleaxe allotments. The average allotment sizes within the residential zones of Dural, Galston, Glenorie and Arcadia Villages is around 1000m². The larger allotment size also provided areas for on-site effluent absorption, however on-site disposal has subsequently been found to be ineffective in some areas. These larger properties are capable of being subdivided into two or more allotments of 500m², which will provide additional infill housing within the Villages and improve the choice of housing types and affordability. It is appropriate that the minimum allotment size remain at 500m² to permit some low density infill development within the Village areas and to ensure efficient use of any land to be serviced and released for residential purposes.

The floorspace ratio controls are applied to control the intensity and scale of development in accordance with the character of surrounding lands. The existing Residential A (Low Density) zone maintains a floorspace ratio of 0.4:1. The majority of land within the Village areas would conform with the maximum floor space ratio, representing a low scale residential development of land. The floorspace ratio of 0.4:1 provides for the erection of a 200m² home on a 500m² allotment. This floorspace ratio is a reasonable balance between property owners' expectations and the need to retain the low scale development of the Village areas. Accordingly, it is appropriate that the 0.4:1 maximum floor space ratio equally apply to the new Residential AR (Low Density - Rural Village) zone.

Business Zones: The strategy has not identified the need to expand or amend the Business zones at Wisemans Ferry or the Dural Service Centre. However, the strategy has identified a need to integrate and rationalise the business centre at Galston Village. The strategy has identified the need to provide a village focal point a mix of commercial and residential uses and car parking.

This could be achieved by granting concessions to encourage the development of the land in accordance with the strategy or through the resumption, development and on-sale of the land.

Rural Areas

Lands zoned Rural comprise the majority of the developed land throughout the study area. The existing Rural A and B zones provide similar land use control with the main distinction being the different subdivision standard and the increased emphasis on the preservation of agricultural land in the Rural A zone. The preceding strategy objectives have highlighted the need for zoning control to better reflect the specific objectives for each area. The most significant criteria for the rural areas is the need to restrain population growth, preserve productive or potentially productive agricultural land and maintain the rural character of the area. A zoning strategy that recognises the population strategy and the rural character and distinguishes the more productive lands from the less productive lands would be appropriate.

Population trends within the study area will be determined by both planning provisions and demographic profiles. While planning cannot easily determine demographic profiles, it can present strategies for population restraint or expansion. The discussion presented in Objective Four concluded that future population growth should not occur in areas of poor land capability or good agricultural production, or areas that cannot be serviced or where development may impact upon water quality. The discussion concludes that there are limited opportunities for additional population growth in the rural area and a policy of constrained population growth is appropriate. Accordingly, planning provisions which restrain population growth should be retained or introduced for the rural area.

The most appropriate means to control population growth is the provision of density standards. For planning purposes, density standards typically take the form of a maximum number of dwellings per hectare or a minimum allotment size for subdivision. The current controls reflect a minimum allotment size for the existing Rural A and B zones of 10ha and 2ha, respectively. These sizes were established on the basis of the country dwelling standards of 1962. The majority of lands within the rural area have been subdivided to these standards, which in themselves represent a constraint to future population growth.

There has been considerable debate concerning the appropriateness of these standards in the context of the changing role and function of rural areas in the Shire. In considering the revision of the subdivision standards, an assessment of their role in satisfying population strategies and promoting agricultural production needs to be made.

In endeavouring to satisfy strategies of population restraint and agricultural production, there is a number of different types of subdivision control, including:

- * minimum allotment size;
- * average allotment size;
- * performance controls;
- * concessional lots;
- * concessional lots without dwelling rights;
- * community title with farmhouse allotments;
- * cluster housing; and
- * dual occupancy.

Appendix K provides a summary of the advantages and disadvantages of each option for subdivision control in the rural areas. Of these options, the one providing greater certainty and ease of administration is the minimum allotment size. While the minimum allotment size fails to provide for a more flexible approach, it provides the greatest certainty to property owners and the broader community, along with a greater ease of administration. Accordingly, it is recommended that a minimum allotment size criteria be retained. It extends therefore, to determine the appropriateness of the 10ha and 2ha standards in the context of population restraint and agricultural production opportunities.

As noted previously the existing subdivision standards of 10ha and 2ha were established on the basis of the country dwelling standards of 1962. The majority of lands within the rural area have been subdivided to these standards which have been consistently applied since their introduction. Unlike the subdivision standards in the urban environment, the justification for a precise standard for rural allotments is less easily determined on the basis of resident or land use need. The setting of a minimum allotment size for rural areas is more determined by broader objectives of population restraint and preservation of potentially productive agricultural land.

Population restraint can most appropriately be achieved through the limitation on the creation of additional properties within an area. The majority of properties within the study area have

been subdivided to their potential under the existing 10ha and 2ha standards. Accordingly, it can be concluded that the retention of the existing 10ha and 2ha standards would achieve the strategy of population restraint.

A more stringent control on population constraint would be achieved if minimum allotment sizes were increased to ensure existing larger parcels, presently able to be subdivided, would no longer retain subdivision potential. There are very few properties that would fall into this category and the retention of existing subdivision potential, if invoked, would have only negligible impact on a strategy of population restraint. It is submitted that the application of allotment sizes larger than presently applicable would also be inequitable and would prejudice the reasonable expectations of property owners.

The adoption of revised allotment sizes smaller than those present would increase opportunities for subdivision which would have resultant increases in population and would be inconsistent with the strategy of population restraint. Accordingly, it can be reasonably concluded that the retention of the existing 10ha and 2ha standards is the most appropriate means of density control to achieve a strategy of population restraint.

In terms of agricultural production, the existing standards do not reflect the precise area required to conduct an agricultural pursuit. However, it would be difficult to establish allotment sizes that would be the most appropriate for agricultural activities, as the land area requirements of the different activities and the individual site characteristics vary so greatly. The value of production estimates for the rural area indicate that agriculture is a viable industry within the existing planning framework and subdivision controls.

The adoption of revised allotment sizes larger than present would not increase the viability of agriculture, as the majority of the study area has been subdivided at, or below, the current minimum allotment sizes. Such a strategy would only affect a few large properties and could prejudice the reasonable expectations of property owners. Similarly, the adoption of revised allotments sizes smaller than present would not increase the opportunities for agriculture. Rather, it would reduce opportunities for agricultural production through the fragmentation of land. Accordingly, it can be reasonably concluded that the retention of the existing 10ha and 2ha

standards is the most appropriate means of density control for the preservation of agricultural potential.

The existing subdivision pattern within the rural areas is a reflection of the previous standards applicable to the Rural A and Rural B zones. It would be appropriate to retain the application of these zonings in the context of subdivision standards for those areas which have a predominance of conforming allotment sizes. The retention of the existing minimum allotment sizes is consistent with the majority of responses to the community survey undertaken in the preparation of this study. It can be surmised that the consistency of application of the standards in themselves has created a certain level of community expectation for development within the area, which should also be considered in the context of determining appropriate planning provisions.

In summary, the retention of the existing 10ha and 2ha standards is the most appropriate means of density control in the context of population restraint, agricultural production and community expectations.

The existing Rural A and B zones have created a distinction in allotment sizes of 10ha and 2ha, although some areas have a series of non-conforming allotments. To reflect the population strategy, it would be appropriate to introduce controls consistent with the existing subdivision standards to reflect the nomination of large holdings and small holdings.

The discussion presented under Objective Three in investigating the role of agriculture within the rural area, recommended that lands currently sustaining or capable of sustaining agriculture should be recognised by their nomination as Agricultural Landscapes zones. It was recommended in that discussion that Agricultural Landscapes zones should apply to land with an agricultural land classification of 2 or 3, and those of a lower class which are agriculturally productive or potentially productive. These lands not only contribute to agricultural production but also contribute to the rural character of the area.

Other land within the rural area has also been identified as contributing to the rural character and rural values within the area. The visual qualities of these lands should be recognised through their nomination as Rural Landscape zones. This category would apply to areas of lower potential agricultural production where the

rural landscape, including agriculture, contributes to the overall character of the area. Accordingly, two zone titles should be included in the LEP relating to Agricultural Landscapes and Rural Landscapes zones. These zones should be supplemented with relevant objectives consistent with the structured format of objectives for the land use tables within the HSLEP.

The discussion presented under Objective Two relating to the extractive resource within the Maroota area recommended that lands containing the resource should be protected from further fragmentation and incompatible land uses through appropriate planning controls, including a specific zoning to reflect the SREP No. 9 area. Accordingly, it is appropriate to include a zoning title reflecting the extractive resource and acknowledging the regional significance of extractive resources in the Maroota area. Land use controls for the zone should be designed to restrict the fragmentation of land, non-compatible land uses and other land uses which might sterilise the sand resource.

The preceding discussion indicates the preferred zoning titles relating to two principal themes of population restraint and appropriate land use. The recommended zones for inclusion in the HSLEP are:

- * Rural AA (Large Holdings - Agricultural Landscapes) zone
- * Rural AR (Large Holdings - Rural Landscapes) zone
- * Rural AE (Large Holdings - Extraction) zone
- * Rural BA (Small Holdings - Agricultural Landscapes) zone
- * Rural BR (Small Holdings - Rural Landscapes) zone

The following discussion provides an overview of the recommended objectives and land use controls for the zones.

Rural Zone Objectives

The Hornsby Shire Local Environmental Plan includes structured objectives for each zone. The first objective describes the general themes and strategies of the zone; the second details the function and land use controls of the zone; and the third provides measures for the environmental conditions of the zone. The following discussion provides an overview of the recommended objectives for each of the zone categories for the rural areas.

Rural AA (Large Holdings - Agricultural Landscapes) zone

Consistent with the agricultural and population strategies, the Rural AA (Large Holdings - Agricultural Landscape) zone is intended to preserve existing or potentially productive agricultural land, maintain the rural character of the area, prevent land fragmentation and limit population growth within the rural area by limiting subdivision to large holdings. The following structured objectives are appropriate for the Rural AA zone:

- (a) to limit population growth, maintain the rural character of the area and ensure that existing or potentially productive agricultural land is preserved in large land holdings.
- (b) to promote agricultural use of land and provide for a range of compatible land uses which maintain the agricultural and rural environment of the area.
- (c) to ensure development is carried out in a manner that improves the environmental qualities and is within the servicing capacity of the area.

Rural AR (Large Holdings - Rural Landscapes) zone

Consistent with the visual qualities of the area and population strategy, the Rural AR (Large Holdings - Rural Landscape) zone is intended to maintain the rural character and limit growth population within the rural area by limiting subdivision to large holdings. The following structured objectives are appropriate for the Rural AR zone:

- (a) to limit population growth and maintain the rural character of the area.
- (b) to provide for a range of compatible land uses, including agriculture, which maintain the rural environment of the area.
- (c) to ensure development is carried out in a manner that improves the environmental qualities and is within the servicing capacity of the area.

Rural AE (Large Holdings - Extraction) zone

The Rural AE (Large Holdings - Extraction) zone is distinguished from the Rural AA zone by the aim to protect the regionally significant extractive

resource within the Maroota area. The zone should discourage activities that are incompatible with extractive industries or which will sterilise the extractive resource. This includes the further subdivision of land which will fragment the ownership of the resource and expose a greater number of residents to extraction. The Rural AE (Large Holdings - Extraction) zone is intended to identify and protect the resource, preserve existing or potentially productive agricultural land, maintain the rural character of the area and limit population growth within the rural area. The following structured objectives are appropriate for the Rural AE zone:

- (a) to limit population growth, protect a regional geological resource, maintain the rural character of the area and ensure that existing or potentially productive agricultural land is preserved.
- (b) to enable extraction of a regional geological resource, prevent fragmentation of land and provide a range of compatible land uses which maintain the rural environment of the area; and
- (c) to ensure development is carried out in a manner that improves the environmental qualities and is within the servicing capacity of the area.

Rural BA (Small Holdings - Agricultural Landscapes) zone

Consistent with the agricultural and population strategies, the Rural BA (Small Holdings - Agricultural Landscapes) zone is intended to preserve existing and potentially productive agriculture land, maintain the rural character and limit population growth within the rural area by limiting subdivision opportunities. The following structured objectives are appropriate for the Rural BA zone:

- (a) to limit population growth, maintain the rural character of the area and ensure that existing or potentially productive agricultural land is preserved.
- (b) to promote agricultural use of land and provide for a range of compatible land uses which maintain the agricultural and rural environment of the area.
- (c) to ensure development is carried out in a manner that improves the environmental

qualities and is within the servicing capacity of the area.

Rural BR (Small Holdings - Rural Landscapes) zone

Consistent with the visual qualities of the area and population strategy, the Rural BR (Small Holdings - Rural Landscape) zone is intended to protect the rural character and limit growth population within the rural area by limiting subdivision opportunities. The following structured objectives are appropriate for the Rural BR zone:

- (a) to limit population growth and maintain the rural character of the area.
- (b) to provide for a range of compatible land uses, including agriculture, which maintain the rural environment of the area.
- (c) to ensure development is carried out in a manner that improves the environmental qualities and is within the servicing capacity of the area.

The above objectives for the rural zones should be included in the structured zoning tables of the Hornsby Shire Local Environmental Plan.

Rural Zones Land Use Tables

The Hornsby Shire Local Environmental Plan (HSLEP) includes a zoning control table for each zone which details land use activities that:

- i do not require development consent;
- ii which require development consent; and
- iii which are prohibited.

The zoning tables typically list land uses which are permitted without development consent or with development consent. All other land uses are prohibited. A definition of the land uses is provided in clause 23 of the HSLEP.

The land use table for each of the proposed Rural zones should reflect the strategy of that zone by permitting uses compatible with the objectives. The land use tables of the existing Rural A and Rural B zones should be transposed to the proposed Rural AA, AR and AE zones and Rural BA and BR zones, respectively, with the following exceptions.

Bus stations: Bus stations consist of permanent structures associated with passenger terminals

and the repair of vehicles. This use is inconsistent with the need to preserve productive agricultural land, rural landscapes and extractive resources. Accordingly, bus stations should not be permitted within any of the proposed rural zones. Bus stations remain a permissible use in Business zones and would be most appropriately located in the Dural Service Centre.

Health consulting rooms: Health consulting rooms are a commercial use which are more appropriately accommodated within the commercial areas of the villages. Consequently, the use should not be permitted within any of the proposed rural zones. A surgery within a dwelling, operated by full time residents of the dwelling, remains a permissible use as a home occupation.

Child care centres, community facilities, places of worship, public buildings: These community uses are incompatible with extraction activities occurring in the area proposed to be nominated for extraction purposes in the Maroota area. The extraction activities would impact upon these uses through traffic volumes, dust and noise pollution. Further, the uses comprise permanent structures which could sterilise extraction of the resource. Accordingly, the uses should not be permitted within the proposed Rural AE zone.

Registered clubs: Registered clubs comprise permanent structures, associated facilities and carparking. Clubs are more appropriately located within Business zones and are considered to be incompatible with productive agricultural land and rural landscapes, and could sterilise extractive resources. Accordingly, registered clubs should not be permitted within the rural zones.

Camp or caravan sites: Camping grounds and caravan parks are currently permitted within the Rural B zone. These uses occupy large areas of land and are incompatible with productive agricultural land and rural landscapes. Additionally, the limited infrastructure of the rural areas is not sufficient to properly service this use and they should not generally be permitted in the rural area. The use of existing caravan parks, at Dural and Wisemans Ferry should be recognised through listing in the land use exception table of clause 22 of the HSLEP.

Education establishments, hospitals: These uses are currently permitted within the Rural B zone. These uses occupy large areas of land and are incompatible with productive agricultural land

and rural landscapes, and could sterilise extractive resources. Additionally, the limited infrastructure and public transport of the rural areas is not sufficient to properly service these uses and the use of the narrow rural roads by buses is inappropriate. Accordingly, these uses should not be permitted in the rural zones. The use of existing public and private schools within the Rural zones, should be recognised through listing in the land use exception table of clause 22 of the HSLEP or their zoning for community purposes.

Bed and breakfast, guesthouse and farmstay: Objective Four discussed the provision of additional tourist accommodation within the rural areas. These types of accommodation are small scale, low impact uses that can be accommodated within existing dwellings. It is appropriate that the uses be permitted within the Rural AA, AR, BA and BR zones. The uses are inconsistent with the objectives of the Rural AE zone and should not be permitted within this zone. The all encompassing land use definition of Tourist Facility should not be permitted within the Rural Areas because a number of the uses are beyond the servicing capacity of the area and would not be compatible with the rural character.

Ecotourism facility: Similar to the visitor accommodation uses, ecotourism facilities was discussed in Objective Four. Development proposals for this use should promote the ecological values of the region and should not impact upon the environment. They should be permitted within the Rural AA, AR, BA and BR zones.

Intensive and extensive agriculture: Objective three proposed the replacement of the existing definition of agriculture with definitions for intensive and extensive agriculture. Currently agriculture does not require consent, except where it involves the clearing of trees or bushland. It is appropriate that extensive agricultural activities continue to not require development consent, in all rural zones, except where the proposal involves land clearing.

Given the environmental constraints of the area and the potential impacts of intensive agriculture on the environment and amenity of residents, it is appropriate that this use require development consent in all proposed rural zones. Applications for intensive agriculture are also required to be referred to the Hawkesbury Nepean Catchment Management Trust for comment.

Given the above exceptions and additions, the Appendix L summarises the land uses proposed to be permitted without development consent and with development consent, within each of the proposed Rural zones. All other uses would be prohibited.

Environmental Protection Zones

The planning report and strategy has identified the need to rationalise the existing Environmental Protection zone boundaries, to better reflect the constraints of the natural environment. The Environmental Protection A (Wetlands) zone boundary should be amended to reflect the provisions of SREP No. 20 and recent wetland mapping. The Environmental Protection B (River Catchment) zone boundary should also be amended to better reflect lands that are not capable of development and should be protected for environmental reasons. This includes land currently zoned Rural and land at Wisemans Ferry currently zoned Residential A. The land use controls for this zone should be amended to permit ecotourism facilities with development consent.

The existing zone objectives and land use tables for the Environmental Protection zones should be retained with the following amendments:

- * consequential amendments to the land use tables to reflect the new definitions of agriculture (intensive and extensive), agricultural structures (small and large).
- * the inclusion of ecotourism facilities as a permitted land use within the Environmental Protection B (River Catchment) zone. Objective Four identified the need for more ecotourism facilities to promote the ecological values of the region. This use should not impact upon the environment.
- * The Environmental Protection C (Tourist) and D (Recreation) land at Wisemans Ferry should be subject to a further review upon the completion of the Hawkesbury Flood Study.

Implementation

The implementation of the review of the planning provisions requires the preparation of a Draft Local Environmental Plan (LEP). The Draft LEP is required to be certified by the Department of Urban Affairs and Planning prior to exhibition for community comment. A Draft LEP incorporating

the recommended amendments is included in this report.

Objective Seven: To provide controls and guidelines for development to improve the environment

Having considered appropriate statutory provisions, it is also necessary to consider appropriate controls to guide and manage development to ensure that strategies are achieved and environmental impacts are not only minimised but environmental conditions are improved and enhanced in the long term. The most appropriate mechanism is through a Development Control Plan (DCP) which supplements the provisions of the LEP by containing guidelines and development controls for activities within the study area. Such a DCP would supersede the existing Rural Lands (Interim) DCP which was adopted as a temporary measure pending the finalisation and adoption of this study. Nevertheless the Rural Lands (Interim) DCP provides a basic framework for a new DCP.

The relevant recommendations arising from the discussions under objectives one to six should be included in the revised DCP in the form of individual planning strategies. The discussions in the previous objectives and in the planning report have also identified the need to incorporate the following specific matters into a DCP:

Planning framework: Development applications should be assessed with regard to the matters for consideration listed in Section 90 of the Environmental Planning and Assessment Act, 1979, SREP No. 9 - Extractive Industries, SREP No. 20 - Hawkesbury Nepean River, various SEPP's and other relevant DCP's.

Ecologically sustainable development: Consistent with the precautionary principle of ESD, where there is a potential threat to the environment from development, a lack of conclusive scientific certainty on possible environmental impacts should not be used as a reason to postpone measures to prevent environmental degradation. Where any proposal will have an adverse impact on water quality, or the impact cannot be scientifically and/or satisfactorily resolved, the proposal should not proceed.

Geology: Controls for extractive industries should be developed to protect the environmental qualities of the immediate and wider area. Geotechnical reports should be required for any development on steep slopes or involving extensive cut and/or fill.

Topography: Design guidelines and assessment criteria for the construction of dwellings, including construction techniques and limiting cut and fill.

Soils: The DCP should introduce elements relating to soil and water management to ensure development is in accordance with the soil capability of the land. Soil and Water Management Plans (SWMP) should accompany development applications.

Acid sulphate soils or potential acid sulphate soils should not be developed, drained or excavated.

Development proposals on land suspected of contamination (including land used for agriculture and industrial uses) should be accompanied by a soil survey, addressing the level of contamination and measures for rehabilitation. The contamination of adjacent properties through runoff, groundwater flows and dust should also be considered.

The need for consent of the Department of Land and Water Resources (Soil Conservation Service) for clearing on land with a slope greater than 33% and mapped as Protected Lands and land within 20m of the Hawkesbury River, Berowra Creek and Marramarra Creek should be referenced.

Drainage: The required soil and water management plan should balance the management of runoff with farm dam storage and the needs of the downstream environment. Pollution should be controlled at its source. Drainage from sites should reflect the pre-existing or natural situation in terms of run-off location, quantity, quality and velocity. Measures to improve water quality should be instituted. Controls relating to flooding and sea level rise should be reviewed upon the completion of the Hawkesbury Floodplain Management Study.

Groundwater: The DCP should require polluted water to be collected and treated to minimise the filtration of pollutants into the soil and groundwater.

Flora: Vegetation communities B, E, H, I, J, K, M, N, P, R, S, W, X and Y should be nominated and controls included to limit inappropriate activities. Guidelines/controls should be provided for development in bushland protection areas and fauna corridor linkages. Vegetation surveys, including identification of rare species, for development proposals in areas covered by

bushland should be required. A 30m buffer area should be maintained around wetlands to Marramarra National Park and Berowra Valley Bushland Park. The DCP should incorporate controls from the Tree Preservation Order, SEPP No. 19 - Bushland in Urban Areas and the Code "Requirements for Development, Building and Subdivision on Land Adjoining Bushland". Landscape plans should require the identification of appropriate species and measures to prevent impacts on native species.

Fauna: Fauna surveys should be undertaken where a development or activity:

- involves the clearing, removal or alteration of bushland;
- is adjacent to National Parks, Nature Reserves, Bushland Parks, public open space (except playing fields or other open areas) or other bushland areas; or
- involves the disturbance to the habitat of endangered fauna.

Where the survey identifies the potential for an impact on native fauna, a Fauna Impact Statement should be prepared. Native fauna should not be prejudiced by interference from humans and domestic animals.

Bushfire: The DCP should introduce guidelines for Fire Protection Zones and for the design and construction of buildings along with requirements for fire fighting equipment access and water trucks.

Air quality: Controls on emissions and dust generation should be included.

Scenic quality: Controls to retain important views and vistas and to strengthen the character and guide development within the nine landscape character types.

Heritage: Archaeological surveys should be undertaken where bushland has not been disturbed. Introduce guidelines for development associated with heritage items, the erection of second dwellings on land containing heritage listed dwellings and for the flexible use of heritage buildings.

Agriculture: Guidelines for soil erosion and nutrient control, noise pollution, visual pollution and odour pollution should be provided in the DCP. The DCP should also require the preparation of farm management plans.

Agricultural and Rural structures: Guidelines for the location, materials and colour of structures should be included in the DCP.

Dams: The DCP should incorporate guidelines for the design and construction of dams. Reference should be made to the requirement for consent of the Department of Land and Water Resources for dams located on watercourses.

Rural Workers' Dwellings: The DCP should provide guidelines for the consideration, use and design of rural workers' dwellings.

Roadside stalls: The DCP should include guidelines for the construction, parking, access and food handling.

Animal boarding and training establishments: Guidelines for the keeping and breeding of animals should be introduced.

Galston Commercial Centre: The DCP should include a masterplan and development controls, relating to:

- the rationalisation of car parking areas;
- the provision of a village green;
- development opportunities for new and or relocated retail and commercial facilities; and
- rationalisation of ingress and egress points.

Tourism: Guidelines should be introduced for the development of tourism facilities and accommodation.

Home and rural industries: Guidelines for the design, number of employees and controls to minimise noise and visual impacts associated with these uses.

Bicycle and pedestrian routes: Appropriate routes linking village areas with community, recreation and social facilities should be identified.

Road network: Setback provisions should be revised. Measures to improve traffic flow and pedestrian safety in the Galston and Dural business areas should be considered.

Subdivision: The DCP should include guidelines for the division of land, having regard to the constraints of the natural environment.

A DCP should be prepared providing objectives, performance criteria and prescriptive measures for the above issues. Development guidelines that have not been addressed within the strategy, are

those associated with infrastructure and the Village areas.

Infrastructure

The Planning Report identified a number of matters associated with the provision of infrastructure which should also be addressed in a DCP, and are discussed below.

Electricity: High voltage transmission lines are located within easements to provide maintenance access and to act as buffer zones. It is appropriate that buildings, sheds, playgrounds and swimming pools be precluded from these corridors. In considering the placement of any future transmission lines, the supply authority should consider the possible visual impact of the structures.

Telecommunications: Hornsby Council's policy to protect and maintain the visual amenity of the Shire by encouraging telecommunication facilities to be located on existing buildings, rather than towers and the sharing of facilities should be included in the DCP.

Gas: To maintain access to the Sydney-Newcastle gas and petroleum products pipeline and to minimise the risk of damage, a buffer to the pipeline should be maintained. The following activities should not be permitted within the easement; excavation, blasting, earthworks, altering the existing ground levels, construction or the cultivation of trees.

Water: Water conservation strategies should be encouraged throughout the study area to reduce runoff and the demand on the water supply network. Education of the rural community with regard to water conservation will assist residents in minimising water usage.

Effluent: The use of any disposal system inappropriate for the location can cause environmental degradation through pollution of water courses and the groundwater and could lead to the spread of viruses. Consequently, on-site effluent disposal systems should only be permitted in areas where the soil is suitable for absorption. The DCP should require soil surveys detailing the soil type and its absorption capacity.

Drainage: In Village areas, new drainage networks should incorporate water sensitive drainage design strategies. Publications such as "Better Drainage" (Land Systems EBC, 1993) promote alternate, innovative approaches to

drainage, including the use of drainage networks as recreation areas, conservation areas and pedestrian links. Prior to the construction of any drainage network, it is necessary to consider the local capability, recreation needs, environmental impacts, existing hydrological cycle and drainage network and determine the appropriate strategy. The following general principles should be included in the DCP:

- * where possible and appropriate natural watercourses should be utilised and not piped;
- * stormwater discharge should reflect the natural situation in terms of quality, quantity and volume, through the use of dispersion, detention and velocity control measures;
- * multiple use drainage system incorporating wetlands should be encouraged in suitable locations.
- * runoff from dwellings should be reduced through the use of pervious surfaces and the collection of roof water in water tanks for garden use.

In recent years, Hornsby Shire Council has reconstructed road edges in the rural areas utilising grass verges which maintain the rural character of the area and reduce runoff by increasing infiltration. This practice should be encouraged to continue.

Village Areas

The existing village areas have their origins in the 1800's with Wisemans Ferry dating back to 1826 and Dural, Galston and Glenorie dating back to the 1880's and 1890's. Consequently, the Villages have developed in an ad hoc manner rather than in accordance with an overall plan. The character of each Village is distinct, as a result of location, land use, subdivision pattern and built form. There is a need to protect and enhance the unique characteristics and environmental features of the Villages.

To guide this process, masterplans, strategies and guidelines have been prepared for Dural, Galston, Glenorie and Wisemans Ferry Villages. The strategies aim to strengthen the individual characters of the villages to assist implementation and coordination of decisions in relation to new development and civic works.

A financial programme to fund the proposed works needs to be prepared, adopted and implemented. Prior to considering the individual

Villages, a number of principles common to all the Villages should be addressed.

Civic Improvements: Civic improvements to enhance the community areas within the Village and surrounding areas should not detract from the Village's built form and setting. Generally, materials and street furniture should be in keeping with the area's rural character and not be over provided. Street furniture should be simple and contemporary in design, avoiding imitation of historic details or elements and should avoid urban elements such as decorative bins and seats or elaborate lights. Paving should use materials common to the rural character of the Village core, such as bitumen, or gravel (for less used surfaces) and possibly sandstone for important areas such as community areas.

Development Control: New development in the Villages should relate to the existing form and nature, employing mainly traditional design and materials, to ensure harmony with existing structures.

Building design should consist of simple forms and planes. Materials such as brickwork, stone masonry and timber framed construction for walls should be encouraged. All roofs should be gabled and the provision of verandahs and courtyards encouraged. In general, the use of earth or ochre tones should be employed, except in the commercial areas. To retain the low scale character of the Villages, buildings should be encouraged to have a maximum height of 7m to the ridge line from natural ground level.

Heritage: The significance of local heritage buildings and settings should be recognised and conserved. Heritage resources should be integral in the future development of the rural Villages and can provide a potential source of income for the village communities, with an increased focus on tourism.

Masterplans: The Masterplans should detail conceptual development strategies for the Villages and be the basis for community discussion. The plans should detail the proposed mix of land uses, building forms and the potential for redevelopment. The Masterplans should include:

- * improved conditions for pedestrians, cyclists and public transport uses;
- * safe and attractive public spaces;
- * mixed use development opportunities; and
- * energy efficient design.

Signs: It is important that signage within the Village areas retain a low key rural character and the amenity of the surrounding area is not adversely affected. Directional and business advertising should be rationalised and limited in number and size.

Commercial signage should relate to the name and purpose of the business only. Lettering and symbols for signs should relate to the historical, rural character of the areas. Commercial signage should be restricted to shopfront awnings and under awnings.

Dural Village

The findings and recommendations from the Dural Village Study (Hornsby Shire Council, 1992) have been embodied in a Development Control Plan (DCP) including a Masterplan for the village. As part of this study a review of the DCP and masterplan has highlighted the need for minor refinements to provide clearer direction.

To reinforce the Village as the 'gateway' to the rural district the Masterplan proposes:

- * street tree planting along the Old Northern Road;
- * the provision of thematic paving and street furniture relating to a rural character;
- * imposition of building design controls relating to a rural character;
- * tapering setbacks to create a sense of entry to and departure from the village;
- * controlling signage to ensure equity in outdoor advertising and an emphasis on the rural character; and
- * a roundabout at the intersection of Galston Road and Old Northern Road.

Old Northern Road is proposed to be widened to four lanes with a median strip from Quarry Road to Galston Road. The road widening is proposed on the western side, located within Baulkham Shire Council area. However, the road widening has not been scheduled by the RTA in the next 5 years.

The implementation of the remaining works requires coordination with Baulkham Hills Shire Council and the RTA. A review of the cost estimates and the preparation of a financial plan should be undertaken to ensure the ongoing commitment in implementing the proposed works.

Galston Village

Galston Village comprises three primary precincts; the cluster of commercial activities along Galston Road (the village core), the collection of community services along Arcadia Road (the civic precinct) and the surrounding residential lands that make up the village. The strategy should reinforce the role of the village precincts; maintain the rural lands that surround the village, strengthen the existing rural character of the village and improve the amenity of the village. This can be achieved by setting performance standards upon new development and provide guidance for civic improvements. The DCP should include urban design guidelines and a Masterplan for the Village.

Village core: The Village Core, located near the corner of Galston and Arcadia Roads, is the focus of commercial activity within the village. The Planning Report concludes that measures are required to improve the definition and amenity of the area, assist the integration and consolidation of further development and provide a focal point or meeting place for the community.

The Village Core should be encouraged to expand to the rear of existing premises rather than be permitted to linearly expand along Galston Road. It is proposed that the property, located to the north of the commercial area be utilised to address the present problems associated with the lack of integration of shops and car parking. This allotment has the potential to address drainage problems and provide a centralised open space or Village Green area.

To facilitate the integration and construction of the Centre and to provide a focus point or village core, particular attention should be given to the treatment of the Village Green. The provision of the Village Green on private lands is most appropriately achieved through the granting of concessional lot sizes to provide sufficient incentive for the owner to dedicate the Village Green area to the public. Alternatively, Council could consider resumption of the land and subsequent installation of the Village Green and development of the remainder of the property.

The focus of the precinct would shift to the Village Green area, a central lawn area for passive recreation, community gatherings, fetes, picnics and markets. The Village Green could also act as a detention basin to temporarily collect stormwater during heavy rains and reduce the extent of flooding in the downstream areas. The detention basin can be formed using landscaped

mounds located on the western or downstream side of the Village Green. The Village Green should be framed with an avenue of local characteristic trees.

The success of the strategy will rely on new development adhering to the overall concept of the Masterplan. New development should assist to define and frame the Village Green in the form of one/two storey development. This will provide an opportunity to encourage mixed development in the area, such as shoptop housing and tourist oriented uses. Shoptop housing would provide small dwellings which may be suitable to young adults.

On the southern side of the Village Green, an opportunity exists for the existing shops to have dual frontage to Galston Road and the Village Green or to provide new development addressing the Village Green. Development in this location should be encouraged to fully utilise the north facing orientation, through the use of pergolas and cantilevered balconies.

The Village Green concept would rationalise the carparking arrangements of the existing commercial area and formalise the ingress and egress points. Carparking is proposed to be located around the periphery of the central lawn area.

To reinforce the village character, new development should be compatible with the scale (height and shape), bulk, massing, siting and arrangement of existing buildings. The use of traditional building materials should be encouraged to contribute the village context. Appropriate materials include stone masonry, brickwork or timber framed construction with corrugated steel roofing.

The hoardings and rooflines of existing shops, along Galston Road, require architectural treatment to unify the commercial facades. Advertising signs need to be reviewed and removed from the shop parapets and footpath. Signs should be restricted to shopfront windows and below awnings. A unified graphic style for signage should be adopted and the information listed on the signs should be kept to a minimum.

It is proposed to replace the existing 90 degree car parking along Galston Road with parallel parking. The reduction in the number of spaces along the road will be compensated with improved parking opportunities at the rear of the shops, around the Village Green. This will

provide an opportunity to establish a pedestrian area in front of the shops and to provide better definition between pedestrian and vehicle areas. Lights, trees, landscaping and surface treatments should be used to define pedestrian zones and to improve the quality of the environment. To present a unified and cohesive rural theme to the village core, the style and placement of the existing seating, bins, timber bollards and pavement bricks should be rationalised and upgraded.

The Planning Report identified that the definition of the village and the village core can be improved with changed road surfaces to define entry thresholds and a review of the existing signage. The roundabouts located on Galston Road mark the entrances to the village and could be better defined through additional landscaping.

An avenue of trees should be planted along the northern side of Galston Road to aid in defining the edge of the village. Avenue tree planting will also enhance the character of the pedestrian areas and add colour to the streetscape.

The rural nature of the land on Galston Road, opposite the existing shops, should be maintained. From this location can be experienced long views or vistas of agricultural/nursery land with bushland setting at a distance.

To enhance the historic library building and its setting, a general upgrade of the library grounds could be achieved through additional landscaping.

A cycle / pedestrian way should be constructed from the village core along Galston Road to Galston High School and along Arcadia Road to Fagan Park to better link these areas.

Civic Precinct: Located along Arcadia Road, north from Galston Road, is the civic precinct comprising the Galston Community Health and Resource Centre, the Hills Memorial Club, Galston Medical Centre, the Community Centre, the Galston Primary School and the Seventh Day Adventist Church. The collection of community orientated services along Arcadia Road should be reinforced and be identified as becoming the civic street of the village. This could be achieved through the construction of buildings for additional civic purposes, such as a new library, police station or medical centre, on the land on the north eastern side of the Village Green, fronting Arcadia Road.

To strengthen the prominence of the civic street (Arcadia Road), it is recommended that an avenue of trees with distinctive colour and canopy be planted. This will additionally provide an attractive main thoroughfare for tourists to Fagan Park. The north-west corner of Arcadia and Galston Road should be landscaped to improve the approach to the village and to define the core.

Glenorie village

Glenorie village is characterised by four distinctive precincts, namely the commercial area, civic area, residential areas, and the recreational areas. All these areas adjoin Old Northern Road and contribute to the small scale rural / bushland character of the village.

Commercial and civic precincts: The commercial and civic precincts are located on opposite sides of Old Northern Road and are separated by the Local Government boundary. The commercial precinct, containing the shopping centre and post office, are located on the western side, within Baulkham Hills Shire. The civic precinct containing the public school, bush fire brigade station, memorial hall, war memorial and bus bay, are located on the eastern side within Hornsby Shire.

The distinct uses within these areas should be maintained although common streetscape treatments should be applied to present a unified appearance. The streetscape could be improved through relatively minor civic works. To enable the Village to present itself in a cohesive manner, a co-ordinated approach by both Baulkham Hills and Hornsby Shire Council's is necessary. A masterplan should be prepared, identifying the urban design guidelines for the area with the emphasis on landscaping, surface treatments and signage.

Uniform landscaping elements, such as street trees with a distinctive colour, along Old Northern Road would visually integrate both sides of the road and reinforce the significance of the road corridor. Gateways to the village should be identified with appropriate signage and landscaping features.

There is an opportunity to provide a tourist information board on the corner of Old Northern and Cairnes Roads. The use of distinctive landscaping would improve the appearance of this area, which is highly visible when approaching from the south.

Residential areas: The residential areas surround the commercial and civic areas within both Local Government areas. Consistent with the discussion in Objective Three, no expansion of the residential areas within Hornsby Shire is proposed.

Recreation areas: Glenorie Park and Glenorie Oval are located to the north of the village. The appearance of these areas could be improved through the use of landscaping to separate the different recreational settings. Baulkham Hills Shire Council should be requested to implement appropriate and integrated landscape treatments for the recreational areas within its LGA, consistent with the Masterplan.

Wisemans Ferry Village

The Wisemans Ferry Precinct Study (Moore, et al, 1994) has formed the basis of this strategy for the Wisemans Ferry area. Recommendations from the study have been incorporated in the strategy. The primary objectives of the Wisemans Ferry Village strategy are to maintain the dramatic natural setting formed and improve the character and amenity of the Village.

Wisemans Ferry Village comprise five precincts, each with its own distinct character, the commercial centre on River Road (the Village core), the public recreational areas, the River flats, bushland backdrop, the civic area (containing the public buildings - the church, Police station and school) and the link to Webb's Ferry.

To protect the history and setting of the village and to achieve a uniform and cohesive theme to the Village, a co-ordinated approach by both Hornsby and Baulkham Hills Shire Council is necessary. To guide works, a Masterplan should be prepared which could form the basis of a Development Control Plan (DCP) for the Village and the surrounding rural/bushland area. The Masterplan should provide guidelines to assist implementation and co-ordination of decisions in relation to new development and civic works so the potential offered by the Village can be realised.

To retain the vitality of the village, it is essential that economic activity is stimulated by encouraging sensitive development. The use of landscaping treatments such as avenue trees to define the different parts of the village should be encouraged and visual linkages with the River should be strengthened. Through the use of

appropriate surface materials, street furniture and landscaping, the existing rural/village atmosphere within the precinct will be maintained.

It is evident that directional and commercial advertising needs to be rationalised and reduced, particularly at the approaches to the village. The height, size, colour and placement of signs and advertising material should be rationalised to achieve consistency with the rural and scenic nature of the precinct.

Village core: To unify and define the Village core, landscaping should be carried out. New development should provide extension of the urban part of the Village and be compatible with the existing buildings in massing, siting and arrangements of buildings.

New development should be compatible with the scale (height and shape) and bulk of existing buildings. The use of traditional building materials should be encouraged to contribute to the village context, such as stone masonry, brickwork, weatherboard, timber construction and corrugated iron. Preferred colours include earth and ochre tones. Weatherboards and timberwork in the village should be painted.

To reinforce the village character in the main street, the verandahs of new buildings should be constructed to immediately abut the street alignment. Setbacks between side boundaries should be kept to a minimum, with any vehicle entrances placed so as to minimise gaps in the frontage line of buildings. Accessways should not be placed adjacent to one another, creating wide gaps.

In the main street of the village, buildings should not exceed two storeys. Basements beneath the grade of the main street should only be permitted where the slope of the site permits. Basement areas should not be visible from the main street and not produce rear elevations of excessive height.

Avenue planting of Eucalypts should occur along the Old Northern Road and poplars along River Road to the ferry area. Parallel car parking on the eastern side of Old Northern Road should be provided for overflow parking.

The character of the village and the surrounding area should be retained by using soft edges, grass verges and natural dish gutters. Hard paved surfaces and formed kerb and gutters should be kept to a minimum.

The Wisemans Ferry Study recommends that the subdivision of land for residential and commercial purposes within the village core should be limited to land between the community centre and Cobham Hall. This will allow for consolidated development that is compatible with the character of the village core. Further residential subdivision of land outside the village core should be avoided and ribbon development along the river should be avoided.

Areas of residential development, along Singleton Road and outside of the village core should be encouraged to build on pole or frame construction to minimise disturbances of the land, thereby minimising soil erosion and alteration of runoff characteristics. The roof pitch and design should reflect the slope of land to ensure conformity. To minimise visual intrusion, development should conform with the height of surrounding topographical features and the dominant tree canopy. The dwellings should be recessive in design and employ materials and finishes to ensure that they will be unobtrusive and complementary to the bushland setting. Terracing of sites should be discouraged. These controls should be incorporated into a DCP.

Public recreation areas: The public recreation areas of the village should be maintained and improved. Recreational facilities require upgrading and different areas need to be defined to attract public use of the land for active and passive recreation.

The area north of the Bowling Green should be improved to maximise its recreational potential for the community and visitors. Additional tree planting to the open space areas adjoining the river, such as the cricket ground, would delineate the areas for passive and active recreation. Additionally, regeneration of the river bank will enhance its appearance and protect the river edge.

The River Flats: The rural character of the River flats should be retained by preserving the planting pattern of the disused orchard, the grassland area and the absence of formed edges along the River.

The natural vegetation along the River's edge should be maintained and restored which will protect the edge of the shore. The protection of reeds and the river bank with temporary fencing will allow for regeneration of the native riverine vegetation, which will strengthen the River bank and enhance its appearance. Long term strategies should include the planting of additional

Casuarinas and Eucalypts to strengthen the riverbank.

An extension to the golf course has been approved, occupying the former orchard and river flats on the eastern side of the Old Northern Road. The Wisemans Ferry Study (Moore, et al) recommended that a landscape plan be prepared to ensure that the row planting of the former orchard, the inclusion of a wetland feature and the character of the river flat location is incorporated in the design of the golf course. Additionally, the former orchard land should incorporate a public walkway along the river bank to facilitate its protection and provide passive recreational use.

The National Parks and Wildlife Service (NPWS) has recommended that a weed management plan be prepared for the Village and River flats, identifying exotic species likely to pose a threat to the natural ecosystems. This is important for riverside plantings which are vulnerable to invasion by Blackberry, Kikuyu and from the Camphor Laurels in the public recreation areas.

Bushland backdrop: The bushland areas surrounding the village need to be conserved and managed so as to increase the viability and conservation of the vegetation cover and protect the dramatic bushland 'backdrop'.

Tourism: The Village has an opportunity to provide additional accommodation to cater for tourists, such as self contained cabin accommodation. The Village requires careful planning and sensitive siting and design of buildings to enhance the value of the area as a tourist destination. Tourism activity will be heavily influenced by the proper management of the natural assets which need a broad scale environmental approach. These issues remain central to any consideration given to Wisemans Ferry Village and its surround.

Implementation

The abovementioned issues should be addressed in the Rural Lands DCP and/or Council's Management Plan, Strategic Planning Programme and other practises.

Draft Local Environmental Plan

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

DRAFT HORNSBY SHIRE LOCAL ENVIRONMENTAL PLAN 1994 (AMENDMENT No.)

I, the Minister for Urban Affairs and Planning, in pursuance of section 70 of the Environmental Planning and Assessment Act 1979, make the local environmental plan set out hereunder.

Minister for Urban Affairs and Planning.

Sydney, 1996.

Name of the plan

1. This plan may be called Hornsby Shire Local Environmental Plan 1994 (Amendment No.).

Aims and objectives of the plan

2. This plan aims to provide a framework for the future management of the rural areas, surrounding lands and waterways in the area of Hornsby by:
 - a) implementing the recommendations and findings of the Hornsby Shire Rural Lands Study;
 - b) promoting agriculture as a viable activity in the rural areas of Hornsby;
 - c) limiting population growth in areas with environmental, infrastructure, transport and service constraints;
 - d) conserving the environmental qualities and character of the rural areas of Hornsby.

Land to which the plan applies

3. This plan applies:
 - a) in relation to clauses 5l and n - to all land within the rural area of Hornsby as indicated on the map marked "Hornsby Shire Local Environmental Plan 1994 (Amendment No.)" deposited in the office of Hornsby Shire Council;
 - b) in relation to clauses 5a, b, c, d, e, f, g, h, i, j, k, and m - to all land within the area of Hornsby.

Relationship to other environmental planning instruments

4. This plan amends the Hornsby Shire Local Environmental Plan 1994 in the manner set out in clause 5.

Amendment of Hornsby Shire Local Environmental Plan 1994

5. The Hornsby Shire Local Environmental Plan 1994 is amended:

- a) by omitting from clause 7(1) the matters "Rural A Zone" and "Rural B Zone" and by inserting in appropriate order the following matter:**

Rural AA (Large Holdings - Agricultural Landscapes) Zone
Rural AE (Large Holdings - Extraction) Zone
Rural AR (Large Holdings - Rural Landscapes) Zone
Rural BA (Small Holdings - Agricultural Landscapes) Zone
Rural BR (Small Holdings - Rural Landscapes) Zone
Residential AR (Low Density - Rural Village) Zone

- b) by omitting from the zoning control table to clause 7 the matter relating to the Rural A Zone and Rural B Zone and by inserting in appropriate order the following matter:**

Rural AA (Large Holdings - Agricultural Landscapes) Zone

Objectives of Zone

- (a) *to restrain population growth, maintain the rural character of the area and ensure that existing or potentially productive agricultural land is preserved in large land holdings.*
- (b) *to promote agricultural use of land and provide for a range of compatible land uses which maintain the agricultural and rural environment of the area.*
- (c) *to ensure development is carried out in a manner that improves the environmental qualities, and is within the servicing capacity, of the area.*

Without Development Consent

Development for the purpose of:

Agricultural structures (not exceeding 5m in height or 200m² gross floor area); agriculture; dwelling-houses; home occupations; rural structures (not exceeding 5m in height or 50m² gross floor area); special care homes; works in accordance with a farm management plan.

Only With Development Consent

Development for the purpose of:

Agricultural structures (with a gross floor area exceeding 200m² or a height greater than 5m); animal boarding or training establishments; aquaculture; attached dwellings; bed and breakfast accommodation; child care centres; communications facilities; community facilities; dams; ecotourism facilities; extractive industries; farmstay accommodation; forestry; group homes; guesthouse accommodation; home industries; intensive agriculture; land clearing; places of worship; public buildings; recreation areas; recreation facilities; residential offices; roadside stalls; rural industries; rural structures (with a gross floor area exceeding 50m² or greater than 5m in height); rural workers' dwellings; stock and sale yards; utility installations; veterinary hospitals.

Subdivision.

Prohibited

Development that is not permitted without development consent or permitted only with development consent.

Description on Map

Coloured light brown and lettered "AA".

Rural AE (Large Holdings - Extraction) Zone

Objectives of Zone

- (a) *to restrain population growth, ensure that existing or potentially productive agricultural land is preserved and protect geological resources.*
- (b) *to enable extraction of geological resources, prevent fragmentation of land and provide for a range of compatible land uses which maintain the rural environment of the area.*
- (c) *to ensure development is carried out in a manner that improves the environmental qualities, and is within the servicing capacity, of the area.*

Without Development Consent

Development for the purpose of:

Agricultural structures (not exceeding 5m in height or 200m² gross floor area); agriculture; dwelling-houses; home occupations; rural structures (not exceeding 5m in height or 50m² gross floor area); special care homes; works in accordance with a farm management plan.

Only With Development Consent

Development for the purpose of:

Agriculture structures (with a gross floor area exceeding 200m² or a height greater than 5m); animal boarding or training establishments; aquaculture; attached dwellings; communications facilities; dams; extractive industries; forestry; group homes; home industries; intensive agriculture; land clearing; mines; recreation areas; recreation facilities; residential offices; roadside stalls; rural industries; rural structures (with a gross floor area exceeding 50m² or greater than 5m in height); rural workers' dwellings; stock and sale yards; utility installations.

Subdivision.

Prohibited

Development that is not permitted without development consent or permitted only with development consent.

Description on Map

Coloured light brown and lettered "AE".

Rural AR (Large Holdings - Rural Landscapes) Zone

Objectives of Zone

- (a) *to restrain population growth and maintain the rural character of the area.*
- (b) *to provide for a range of compatible land uses, including agriculture, which maintain the rural environment of the area.*
- (c) *to ensure development is carried out in a manner that improves the environmental qualities, and is within the servicing capacity, of the area.*

Without Development Consent

Development for the purpose of:

Agricultural structures (not exceeding 5m in height or 200m² gross floor area); agriculture; dwelling-houses; home occupations; rural structures (not exceeding 5m in height or 50m² gross floor area); special care homes; works in accordance with a farm management plan.

Only With Development Consent

Development for the purpose of:

Agricultural structures (with a gross floor area exceeding 200m² or a height greater than 5m); animal boarding or training establishments; aquaculture; attached dwellings; bed and breakfast accommodation; child care centres; communications facilities; community facilities; dams; ecotourism facilities; extractive industries; farmstay accommodation; forestry; group homes; guesthouse accommodation; home industries; intensive agriculture; land clearing; mines; places of worship; public buildings; recreation areas; recreation facilities; residential offices; roadside stalls; rural industries; rural structures (with a gross floor area exceeding 50m² or greater than 5m in height); rural workers' dwellings; stock and sale yards; utility installations; veterinary hospitals.

Subdivision.

Prohibited

Development that is not permitted without development consent or permitted only with development consent.

Description on Map

Coloured light brown and lettered "AR".

Rural BA (Small Holdings - Agricultural Landscapes) Zone

Objectives of Zone

- (a) *to restrain population growth, maintain the rural character of the area and ensure that existing or potentially productive agricultural land is preserved.*
- (b) *to promote agricultural use of land and provide for a range of compatible land uses which maintain the agricultural and rural environment of the area.*
- (c) *to ensure development is carried out in a manner that improves the environmental qualities, and is within the servicing capacity, of the area.*

Without Development Consent

Development for the purpose of:

Agricultural structures (not exceeding 5m in height or 200m² gross floor area); agriculture; dwelling-houses; home occupations; rural structures (not exceeding 5m in height or 50m² gross floor area); special care homes; works in accordance with a farm management plan.

Only With Development Consent

Development for the purpose of:

Agricultural structures (with a gross floor area exceeding 200m² or a height greater than 5m); animal boarding or training establishments; aquaculture; attached dwellings; bed and breakfast accommodation; child care centres; communication facilities; community facilities; dams; ecotourism facilities; extractive industries; farmstay accommodation; forestry; group homes; guesthouse accommodation; home industries; intensive agriculture; land clearing; mines; places of worship; public buildings; recreation areas; recreation facilities; residential offices; roadside stalls; rural industries; rural structures (with a gross floor area exceeding 50m² or greater than 5m in height); rural workers' dwellings; stock and sale yards; utility installations; veterinary hospitals.

Subdivision.

Prohibited

Development that is not permitted without development consent or permitted only with development consent.

Description on Map

Coloured brown and lettered "BA".

Rural BR (Small Holdings - Rural Landscapes) Zone

Objectives of Zone

- (a) *to restrain population growth and maintain the rural character of the area.*
- (b) *to provide for a range of compatible land uses, including agriculture, which maintain the rural environment of the area and support the urban populace.*
- (c) *to ensure development is carried out in a manner that improves the environmental qualities, and is within the servicing capacity, of the area.*

Without Development Consent

Development for the purpose of:

Agricultural structures (not exceeding 5m in height or 200m² gross floor area); agriculture; dwelling-houses; home occupations; rural structures (not exceeding 5m in height or 50m² gross floor area); special care homes; works in accordance with a farm management plan.

Only With Development Consent

Development for the purpose of:

Agricultural structures (with a gross floor area exceeding 200m² or a height greater than 5m); animal boarding or training establishments; aquaculture; attached dwellings; bed and breakfast accommodation; child care centres; communication facilities; community facilities; dams; ecotourism facilities; extractive industries; farmstay accommodation; forestry; group homes; guesthouse accommodation; home industries; intensive agriculture; land clearing; mines; places of worship; public buildings; recreation areas; recreation facilities; residential offices; roadside stalls; rural industries; rural structures (with a gross floor area exceeding 50m² or greater than 5m in height); rural workers' dwellings; stock and sale yards; utility installations; veterinary hospitals.

Subdivision.

Prohibited

Development that is not permitted without development consent or permitted only with development consent.

Description on Map

Coloured brown and lettered "BR".

Residential AR (Low Density - Rural Village) Zone

Objectives of Zone

- (a) *to provide for the housing needs of the rural village population of the Hornsby area.*
- (b) *to promote a variety of housing types and other land uses compatible with a low density rural village environment.*
- (c) *to provide for development that is within the environmental capacity of a low density rural village environment.*

Without Development Consent

Development for the purpose of:

Home occupations; dwelling-houses; special care homes.

Only With Development Consent

Development for the purpose of:

Bed and breakfast accommodation; child care centres; community facilities; group homes; housing for aged or differently abled persons; recreation areas; recreation facilities; utility installations.

Subdivision.

Prohibited

Development that is not permitted without development consent or permitted only with development consent.

Description on Map

Coloured pink and lettered "AR".

- c) by omitting from the zoning control table to clause 7 in the matter relating to the Business E (Service Centre) Zone under the heading "Only With Development Consent" the words "animal establishments;" and by inserting under that heading in alphabetical order, the words "animal boarding or training establishments;" and "intensive agriculture;";
- d) by inserting in the zoning control table to clause 7 in the matter relating to the Open Space A (Public Recreation - Local) Zone, the Open Space B (Public Recreation - District) Zone, the Open Space C (Private Recreation) Zone and the Environmental Protection A (Wetlands) Zone, respectively, in each case under the heading "Only With Development Consent" and in alphabetical order, the words "intensive agriculture;";
- e) by omitting from the zoning control table to clause 7 in the matter relating to the Environmental Protection B (River Catchment) Zone, the Environmental Protection C (Tourist) Zone and the Environmental Protection D (Recreation) Zone, respectively, under the heading "Without Development Consent" the words "(which does not involve the clearing of trees or bushland)";
- f) by omitting from the zoning control table to clause 7 in the matter relating to the Environmental Protection B (River Catchment) Zone, the Environmental Protection C (Tourist) Zone and the Environmental Protection D (Recreation) Zone, respectively, under the heading "Only With Development Consent" the words "agriculture (which involves the clearing of trees or bushland);;" and by inserting instead, in each case and in alphabetical order, the words "intensive agriculture;";
- g) by inserting in the zoning control table to clause 7 in the matter relating to the Environmental Protection B (River Catchment) Zone under the heading "Only With Development Consent" and in alphabetical order the words "ecotourism facilities;";
- h) by omitting from the Minimum Allotment Size Table to clause 14(2) the following matter:

Rural A	10ha
Rural B	2ha,

and by inserting instead, in the appropriate order, the following matter:

Rural AA (Large Holdings - Agricultural Landscapes)	10ha
Rural AE (Large Holdings - Extraction)	10ha
Rural AR (Large Holdings - Rural Landscapes)	10ha
Rural BA (Small Holdings - Agricultural Landscapes)	2ha
Rural BR (Small Holdings - Rural Landscapes)	2ha
Residential AR (Low Density - Rural Village)	500m ²

- i) by inserting in the appropriate location in the Floorspace Ratio Table to clause 15(1) the following matter:

Residential AR (Low Density - Rural Village)	0.4:1
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j) by inserting the following subclauses at the end of clause 18:

Conservation Incentives

- (10) The Council may grant consent to an application to carry out development involving the use, for any purpose, of a building that is a heritage item on land zoned Rural AA, AR, BA or BR, even though that development is prohibited elsewhere in this plan, if it is satisfied that:
- (a) the proposed development would not adversely affect the heritage significance of the item and its setting, or the amenity of the area; and
 - (b) the proposed development would not adversely affect the traffic or car parking conditions of the site or area; and
 - (c) the proposed development is compatible with the rural character of the area; and
 - (d) the conservation of the building depends on the granting of the consent.
- (11) The Council may grant consent to an application to carry out development involving the erection of a second dwelling on a site that contains a heritage item, even though that development is prohibited elsewhere in this plan if:
- (a) the item is located on land zoned Rural AA, AR, BA or BR; and
 - (b) the Council is satisfied that the erection of a second dwelling would not adversely affect the heritage significance of the item or its setting; and
 - (c) the conservation of the building depends on the granting of the consent.

k) by omitting clause 19 and by inserting instead the following clause:

19.

FLORA AND FAUNA PROTECTION

Objective of Provision

To protect significant flora and fauna habitats and wildlife corridors.

Bushland conservation area

- (1) A person shall not carry out development on land within a bushland conservation area without the consent of the Council.

(2) A reference in any State Environmental Planning Policy or Regional Environmental Plan to:

- (a) a conservation area; or
- (b) a heritage conservation area; or
- (c) a bushland conservation area,

shall be taken to include a reference to a bushland conservation area within the meaning of this plan.

(3) For the purpose of this clause:

"**adjoining land**" means all land which directly affects land in a bushland conservation area as a consequence of proximity, drainage or the like, and includes all land within 20 metres of a bushland conservation area and land within the National Parks and Nature Reserves Zone;.

"**development**" on land within a bushland conservation area includes:

- (a) the erection of a fence or any other structure at all on the land; and
- (b) the removal of soil or rock from the land; and
- (c) the deposit of soil, rock or any other matter on the land; and
- (d) the destruction or removal of any tree, bushland or other vegetation on the land, other than noxious weeds or non-native species; and
- (e) the alteration of a natural watercourse or drainage;

"**plan of management**" in terms of Flora and Fauna Protection means:

- (a) a plan of management for community land adopted under the Local Government Act 1993; or
- (b) a plan of management relating to a Crown Reserve adopted under the Crown Lands Act 1989; or
- (c) a plan of management relating to a wildlife refuge adopted under the National Parks and Wildlife Act 1974; or
- (d) a plan of management relating to a conservation area adopted under the National Parks and Wildlife Act 1974; or
- (e) a bush fire management plan adopted under the Bush Fires Act 1949; or

- (f) a management statement relating to land under community title registered under the Community Land Management Act 1989; or
 - (g) a plan of management prepared by or on behalf of a landowner.
- (4) The Council shall consider the following matters in determining applications for consent to carry out development on land within a bushland conservation area, or on adjoining land:
- (a) the presence on the land of threatened plants or animals;
 - (b) the significance of vegetation communities on the land;
 - (c) the significance of fauna habitat on the land;
 - (d) measures to be taken in carrying out the proposed development to ameliorate any impacts on bushland; and
 - (e) the purpose and significance of any corridor and the likely effect of the proposed development on species likely to utilise the corridor.

Plans of Management

- (5) Nothing in this clause requires the consent of the Council to be obtained for any act that is carried out in the ordinary course of occupation, use or management of land, if the act is carried out in accordance with a plan of management which has been certified by the Council pursuant to this clause.
- I) by inserting at the end of the Land Use Exceptions Table to clause 22 the following matter:

Land within a Rural zone	Each site for which consent has been obtained for the use of a building or land for an education establishment prior to the commencement of Hornsby Shire Local Environmental Plan 1994 (Amendment No.).	Education establishments
---------------------------------	--	---------------------------------

Land within a Rural zone	Each site for which consent has been obtained for the use of a building or land for a caravan park prior to the commencement of Hornsby Shire Local Environmental Plan 1994 (Amendment No.).	Caravan parks
---------------------------------	--	----------------------

- m) by omitting from clause 23 the definitions of "agriculture", "animal establishment", "home industry", "motel" and "tourist facility" and by inserting instead, in alphabetical order, the definitions:

"agriculture" means:

- (a) the growing of rain-fed crops where fertilizer and irrigation is applied from time to time, and includes the growing of pasture and orchards; or
- (b) the grazing of animals such as beef and dairy cattle, deer and alpaca for commercial purposes;

"animal boarding or training establishments" means a building or place used for the breeding, boarding, training or keeping of, or for caring for, non-livestock animals for commercial purposes where the majority of feed is not grown on the land on which the building or place is located, and includes a riding school;

"bed and breakfast accommodation" means a dwelling-house within which accommodation and breakfast are provided for a tariff:

- (a) by any one or more of the permanent residents of the dwelling house; and
- (b) on a short term basis for a maximum of 6 travellers; and
- (c) without the exhibition of any notice, advertisement or sign (other than a non-illuminated notice or sign which would fit within a rectangular figure of 0.5m²);

"bushland conservation area" means land designated "bushland conservation area" on the map;

"bushland corridor" means land designated "bushland corridor" on the map;

"core bushland" means land designated as "core bushland" on the map;

"ecotourism facility" means any nature based tourism activity or facility that involves education and interpretation of the natural environment and that is managed so as to be ecologically sustainable. It may include the encouragement of local culture, including aboriginal history, the education of visitors and locals to increase respect for their surroundings, and/or the development of infrastructure to protect and conserve sensitive sites. It may include the construction of staff quarters or guesthouse accommodation;

"farm management plan" means a plan of management prepared by or on behalf of a landowner for the on-going management of land used or prosed to be used for the purposes of agriculture, an animal boarding or training establishment or intensive agriculture, being a plan that:

- (a) has been approved by the Council; and
- (b) predicts all farm management practices for a 10 year period; and
- (c) provides for a new farm management plan to be prepared and lodged with the Council at the end of the 10 year period; and
- (d) indicates agricultural, soil, water, nutrient and vegetation management practices appropriate to the land; and
- (e) provides for an update report on the implementation of the plan is to be submitted to the Council every 2 years;

"farmstay accommodation" means owner-occupied premises, used for the purpose of agriculture, aquaculture or an animal boarding or training establishment, which are also used for the temporary or short term accommodation of a maximum of 6 travellers at any one time and which may include the provision of breakfast and planned farm related guest activities, but does not include a restaurant;

"guesthouse accommodation" means owner occupied residential premises used for the temporary or short term accommodation of paying guests and which includes the provision of meals in its tariff, but does not include a restaurant;

"home industry" means a light industry carried on in a building where:

- (a) the industry is undertaken by one or more of the permanent residents of the dwelling; and
- (b) the industry does not involve the employment of more than 3 persons other than those residents; and
- (c) the industry does not interfere in any way with the amenity of adjoining properties or the locality in which the dwelling is situated; and
- (d) the industry does not occupy an area of more than 200 square metres; and
- (e) the industry does not involve the exhibition of any notice, advertisement or sign (other than a notice or sign which would fit within a rectangular figure 1.2 metres in length and 0.6 metres in height and exhibited on that dwelling or land to indicate the name and occupation of the resident);

"land clearing" means the removal or destruction of bushland or vegetation within a bushland conservation area;

"intensive agriculture" means:

- (a) the nurturing of livestock by a feeding method other than natural grazing and without limiting the generality of the foregoing, includes such nurturing on or in feedlots, poultry farms, dairy farms and piggeries, but does not include such nurturing livestock or poultry intended solely for personal consumption or enjoyment by the owner or occupier of the land on which the nurturing takes place; or
- (b) the growing of plants on a commercial basis, whether under cover or in the open, where the application of water and fertiliser is significantly above that naturally occurring, and includes the growing of vegetables, flowers and ornamental plants; or
- (c) agriculture which involves the clearing of land;

"motel" means premises, not being a hotel, used for the temporary or short term accommodation of travellers, and which may also include a restaurant and / or conference facilities;

"other significant bushland" means land designated "other significant bushland" on the map;

"rural structure" means any shed, barn, outbuilding or the like associated with a dwelling and used by the permanent residents for storage, hobbies, home occupations and the like;

"tourist facility" means an establishment providing primarily for tourist accommodation or recreation, or both, and may include bed and breakfast accommodation, boatsheds, boat landing facilities, camp or caravan sites, ecotourism facilities, farmstay accommodation, guesthouse accommodation; holiday cabins, picnic grounds, house boats, playgrounds, restaurants, water sport facilities, clubs, marinas and motels;

- (n) by inserting at the end of the definition of "the map" in clause 23 (1) the following words:

Hornsby Shire Local Environmental Plan 1994 (Amendment No.)

EXPLANATORY NOTES - RURAL LANDS LEP

HORNSBY SHIRE LOCAL ENVIRONMENTAL PLAN

(AMENDMENT No.)

The Hornsby Shire Local Environmental Plan 1994 (HSLEP) is the planning instrument that controls land use within Hornsby Shire. This Draft LEP seeks to update the planning controls that apply to the rural areas of the Shire by amending specific clauses in the HSLEP. For a complete understanding of the implications of this Draft LEP, the HSLEP should be examined.

Should you have any questions concerning the Draft LEP please contact Council's Planning Branch on 847-6726.

Note: References to "Amendment No. " will eventually be replaced with a reference to a specific HSLEP Amendment number eg. "Amendment No. 7".

Clause 1: Indicates that this LEP is known as the Hornsby Shire Local Environmental Plan 1994 (Amendment No.).

Clause 2: Provides the aim and objectives of this LEP, namely:

To provide a framework for the future management of the rural areas, surrounding lands and waterways through:

- a) implementing the recommendations and findings of the Hornsby Shire Rural Lands Study;
- b) promoting agriculture as a viable activity in the rural areas of Hornsby;
- c) limiting population growth in areas with environmental, infrastructure, transport and service constraints;
- d) conserving the environmental qualities and character of the rural areas of Hornsby.

Clause 3: Indicates that certain clauses only apply to the area indicated on the LEP map, whereas other clauses apply to all land within Hornsby Shire. This second part allows amendments to the clauses in the HSLEP, such as land use tables and definitions, to apply throughout Hornsby Shire.

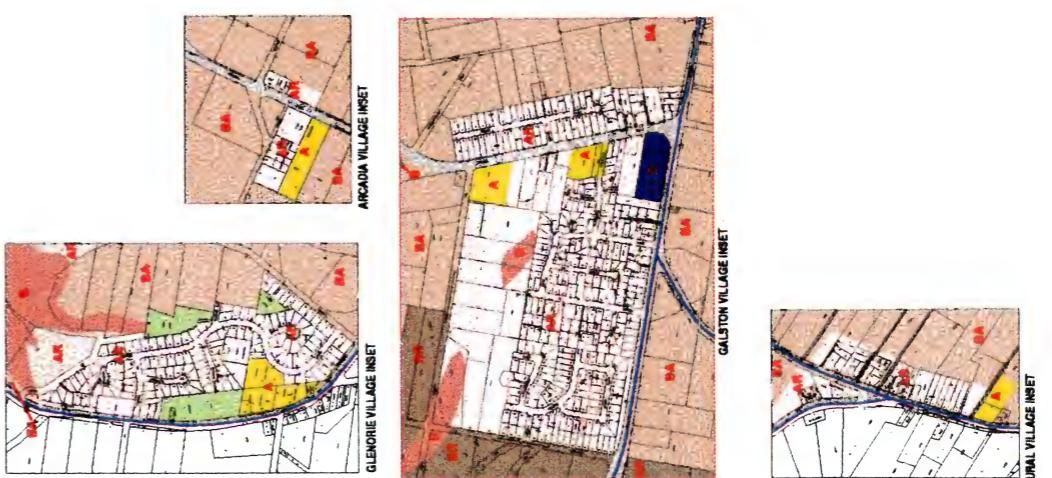
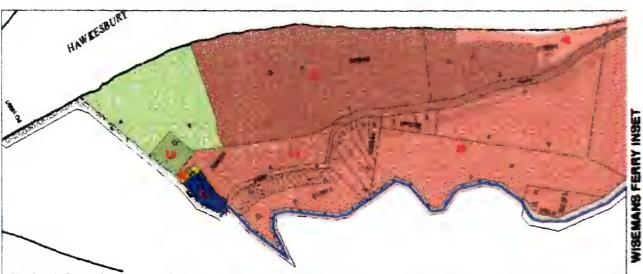
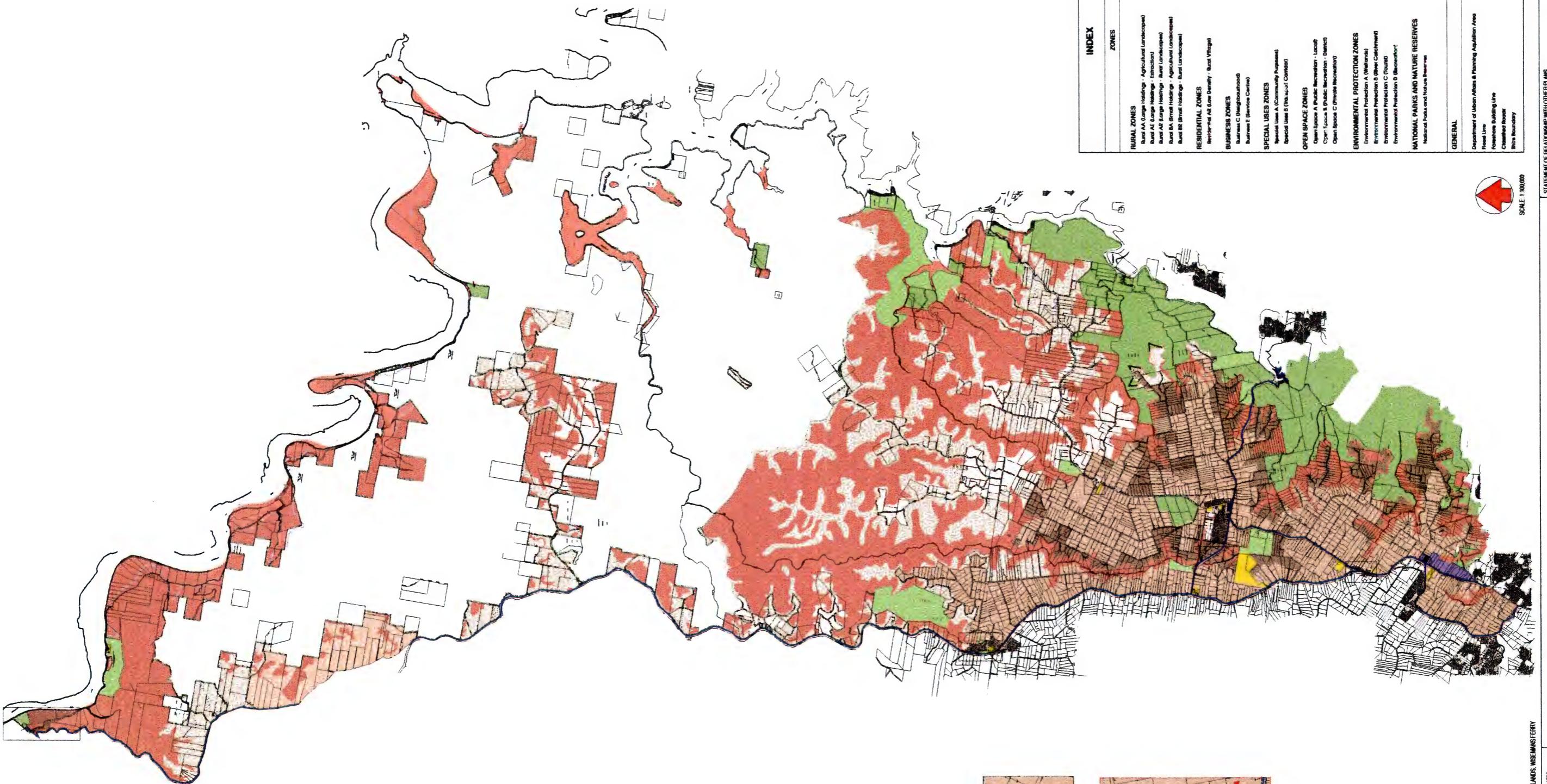
Clause 4: Indicates that this LEP seeks to amend the Hornsby Shire Local Environmental Plan 1994.

Clause 5: Indicates the proposed amendments to HSLEP, namely:

- a) HSLEP sub clause 7(1) - amends the list of zones by replacing the Rural A and B zones with the proposed 5 Rural zones and includes the proposed Residential AR zone;
- b) HSLEP subclause 7(2) - deletes the zoning control (land use) tables for the Rural A and B and inserts the proposed zoning control tables for the 5 proposed Rural zones and the Residential AR zone. The tables have the same format as the existing zones.
- c to f) HSLEP subclause 7(2) - makes consequential amendments to the land use tables for other zones as a result of the proposed amendment of definitions and the introduction of new definitions in clause 23 - The Dictionary;

- g) HSLEP subclause 7(2) - includes ecotourism facilities as a land use which is permissible providing development consent is obtained in the Environmental Protection B (River Catchment) zone;
- h) HSLEP subclause 7(2) - deletes the minimum allotment sizes for the Rural A and B zones and inserts the minimum allotment sizes for the 5 proposed Rural zones and the Residential AR zone;
- i) HSLEP subclause 15(1) - inserts the floorspace ratio of 0.4:1 for the proposed Residential AR zone;
- j) HSLEP clause 18 - introduces heritage conservation incentives into the heritage provision, which will apply to the rural areas, namely:
 - to permit heritage buildings to be used for alternative uses, even if those uses are not permitted within the zone; and
 - to permit the erection of a second detached dwelling on a rural property with a heritage building;
- k) HSLEP clause 19 - replaces clause 19 Bushland Protection with a new provision for the protection of flora and fauna. Flora and Fauna Protection areas as indicated on the LEP maps;
- l) HSLEP clause 22 - provides that existing approved education establishments and caravan parks remain as permitted land uses, despite these uses no longer being permitted in the rural zones;
- m) HSLEP clause 23 - amends the definitions of agriculture, animal establishments, home industry, motel, tourist facility and inserts new definitions for:

agricultural activities: tourism activities: flora and fauna protection:	<ul style="list-style-type: none"> - intensive agriculture - rural structures - farm management plan - bed and breakfast accommodation - farmstay accommodation - guesthouse accommodation - ecotourism facility - bushland conservation area - bushland corridor - core bushland - land clearing - other significant bushland
--	--
- p) HSLEP clause 23 - allows the zoning map for this LEP to amend the zoning maps for the HSLEP.



LOCATION	LAND INFORMATION SYSTEM	DATE
DURBIN	P1002	DEPT DATE
SUPERVISING DRAFTSMAN	G.A.	DATE 20/2/2006
PLANNING OFFICER		DATE
COUNCIL FILE NO		DATE
CERTIFICATE ISSUED UNDER SECTION 66 EPA ACT 1999		
CERTIFICATE NUMBER	CP 1019561	

STATEMENT OF RELATIONSHIP WITH OTHER PLANS

HORNSBY SHIRE LOCAL ENVIRONMENTAL PLAN 1994

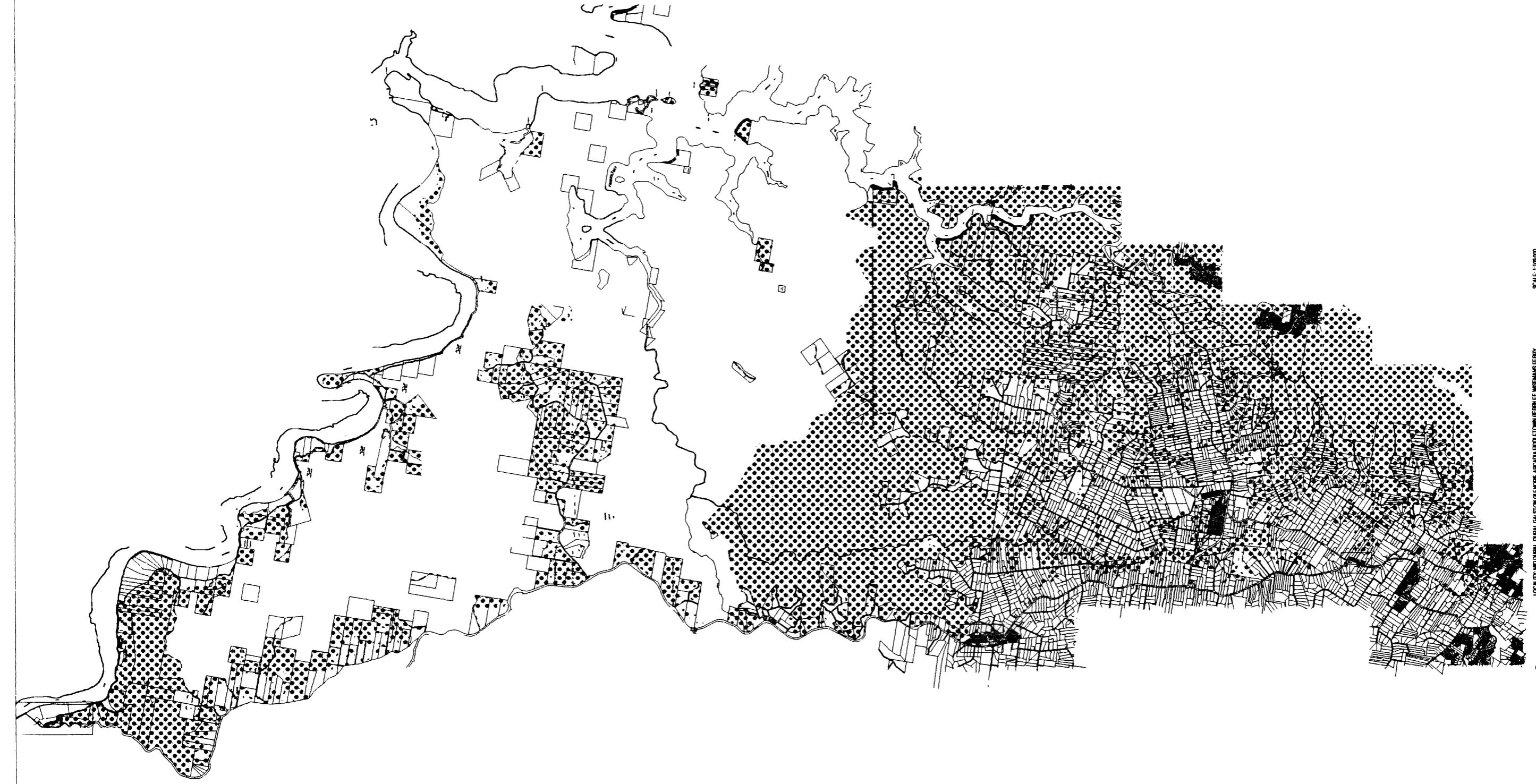
ENVIRONMENTAL PLANNING & ASSESSMENT ACT, 1979

DRAFT LOCAL ENVIRONMENTAL PLAN AMENDMENT NO. X

GENERAL MANAGER	DATE

CERTIFIED IN ACCORDANCE:
WITH THE ENVIRONMENTAL
PLANNING & ASSESSMENT ACT
1999 AND REGULATIONS

SCALE: 1:100,000



ENVIRONMENTAL PLANNING & ASSESSMENT ACT, 1979

HORNSBY SHIRE COUNCIL

DRAFT LOCAL ENVIRONMENTAL PLAN AMENDMENT No. X

STATEMENT OF RELATIONSHIP WITH OTHER PLANS

AMENDS HORNSBY SHIRE LOCAL ENVIRONMENTAL PLAN 1994

CERTIFIED IN ACCORDANCE
WITH THE ENVIRONMENTAL
PLANNING & ASSESSMENT ACT
1979, AND REGULATIONS

GENERAL MANAGER DATE

INDEX	
GENERAL	
Burden Protection	[Symbol: Dashed line]
Site Boundary	[Symbol: Solid line with arrows]

BURDEN PROTECTION

SITE BOUNDARY

GENERAL MANAGER DATE

LOCATION AND DURAL CATCHMENT AREA, ARCADIA FOLD TOWNSHIP, MEANS TERRITORY

LAND INFORMATION SYSTEM DATE: 20.08.1996

SUPERVISOR DRAFTMAN DATE: 20.08.1996

DEPT:

PLANNING OFFICER DATE:

DEPT:

COUNCIL FILE NO. DATE:

CP:

CERTIFICATE ISSUED UNDER SECT 65 EPA ACT 1990

CP:

CERTIFICATE PLAN NUMBER

CP:

Draft Development Control Plan

HORNSBY SHIRE



DRAFT RURAL LANDS
DEVELOPMENT CONTROL PLAN



CONTENTS

Part 1 - The Plan

	Page No.
Preamble	3
Purpose	3
Objectives	3
Procedures	3
Information required for Development Applications	5

Part 2 - Strategy

Environmental Strategy	8
Population Strategy	9
Rural Strategy	10
Economic Strategy	11
Community Services Strategy	12
Transport Strategy	13

Part 3 - Controls

Land Uses

Subdivision	15
Attached dwellings	16
Rural workers dwellings	17
Agricultural and rural structures	18
Dam construction	19
Roadside stalls	20
Home industry, home occupation, residential office	21
Keeping of animals and animal boarding or training establishments	22
Rural industries	23
Extractive Industries	24
Tourism	25

Elements

Dwelling Design	27
Setbacks	28
Soil and water management	29
Drainage Control	31
Effluent Disposal	32
Flora and Fauna Protection	33
Visual Amenity	35
Landscaping	36
Fences and Gates	37
Heritage	38
Fire Hazard	40
Air Quality	41
Contributions	42

Appendices



The Plan

THE PLAN

PREAMBLE

This Development Control Plan (DCP) applies to lands within the Rural areas of Hornsby Shire as indicated on Figure 1. The plan is called the "Rural Lands Development Control Plan" and came into force on , 1996.

PURPOSE

What is the purpose of this DCP?

The primary purpose of the DCP is to provide planning strategies and controls for development within the rural area based on the findings of the Rural Lands Study.

OBJECTIVES

What are the objectives of this DCP?

The objectives of this DCP are;

- to provide land use direction for the rural area;
- to provide measures to protect the natural and built environment;
- to enhance the established character of the rural areas; and
- to ensure development relates to site conditions.

PROCEDURES

When is a development application not required?

A development application is not required to be lodged with Council for the erection of a single dwelling house on an allotment, agricultural structures less than 200m² and 5m in height, extensive agriculture (which does not involve the clearing of trees and/or bushland), home occupations and special care homes.

State Environmental Planning Policy (SEPP) No. 4 - Development Without Consent, permits without the need for development consent certain activities, which are of a minor nature.

Where development consent is not required by virtue of the zoning table or SEPP No. 4, a Building Application is still required to be lodged with Council for the erection of any structure or building.

When is a development application required?

A development application is required for all permissible development, other than that listed above. Prior to the commencement of a development, formal Council consent is required. Consent can be sought through the submission of a Development Application (refer Figure 2 - Development Application Procedures).

When is an Environmental Impact Statement (EIS) required?

The Regulations of the Environmental Planning and Assessment Act classify certain activities which have the potential to cause significant environmental impact, as designated development.

Designated development requires the preparation and assessment of an Environmental Impact Statement (EIS) as part of a Development Application.

Proponents of designated development are required to consult with the Department of Planning for guidelines for the preparation of the EIS.

The following activities which are classified as designated development are permissible with development consent in the Rural zones:

- * Agricultural produce industries;
- * Aquaculture;
- * Artificial waterbodies (large dams);
- * Extractive industries
- * Livestock intensive industries;
- * Mines

How does Council consider a development application?

In assessing development proposals, Council will have regard to Section 90 of the Environmental Planning and Assessment Act, 1979, how the development satisfies the aims and objectives of the Hornsby Shire Local Environmental Plan and conforms with the provisions of this DCP. In assessing development proposals consideration will also be given to how they comply with the provisions of SREP, No.20 - Hawkesbury-Nepean River and other relevant SEPP's and SREP's. Depending on the proposal these may include:

- SEPP No. 5 - Housing for aged or disabled persons
- SEPP No. 19 - Bushland in urban areas
- SEPP No. 30 - Cattle feed lots
- SEPP No. 34 - Major employment generating development.
- SEPP No. 44 - Koala habitat
- SREP No. 9 - Extractive industry

A copy of Section 90 of the Act is provided on the inside back cover of this DCP.

How does this DCP work?

The next section Part 2 - Strategies, provides planning strategies for the area to indicate the direction of the Rural Lands and the framework for assessment of proposals.

The following section, Part 3 - Controls, provides requirements and guidelines for specific land uses and requirements for all types of developments, including the specific land uses. All sections comprise objectives, performance criteria and prescriptive measures.

The land use and element objectives may be implemented by meeting either the performance criteria or the prescriptive measures. Meeting performance criteria enables the development of innovative schemes that meet the particular characteristics of an individual site.

Prescriptive measures are requirements that Council consider are likely to meet the objectives and performance criteria of the particular control element. Compliance with the prescriptive measures does not guarantee approval of an application, the application must also achieve the element objectives and performance criteria.

Other relevant DCP's

Proponents of development should also have regard to the provisions of other relevant DCP's depending on the nature of the proposal. Relevant DCP's may include:

Heritage DCP
Car Parking DCP
Extractive industries - Maroota DCP
Outdoor Advertising DCP
Residential Subdivision DCP
Dural Village DCP

Amendments

Nil

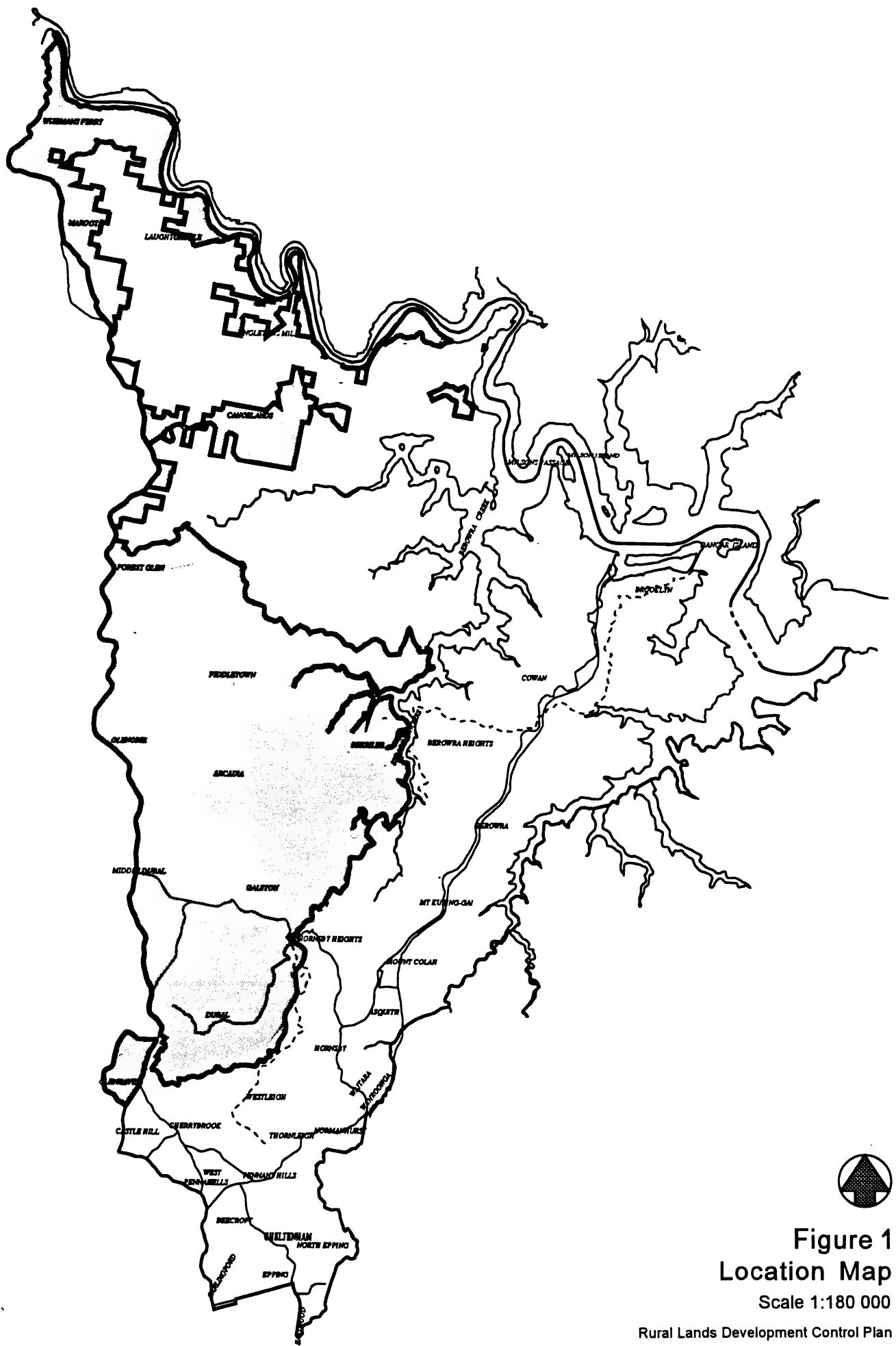


Figure 1 Location Map

Scale 1:180 000

Rural Lands Development Control Plan

Information required with a Development Application for a rural land use

Property Dimensions The size of the land is to be indicated, including the metric length of all boundaries and the area of the site shown in square metres or hectares.

Where a property is affected by an easement or R.O.W. Its exact location in relation to the boundaries of the land, width, length and type; e.g., for water, vehicular access.

Scale of Plans

Floor plans	1:100
Elevations	1:100
Sections	1:100
Site plans	1:200

Existing Building/Improvement All existing buildings and improvements are to be shown on plan including offsets from boundaries.

Water Mains The location of existing/proposed Water Mains. If the mains do not burden the property, indicate their location, e.g. in street or laneway or adjacent property.

Contour Levels to Australian Height Datum - All measurements are to be clearly tied to A.H.D. and not assumed reduced levels.

Floor and ridge levels to A.H.D. should be shown on the elevations and sections.

Existing Stormwater Drainage - to be shown on site plan.

Proposed Stormwater Drainage - to be indicated on plan to show how proposed drainage will be achieved.

Waterways and Watercourses - to be shown on site plans.

Sediment and Erosion/Control - Details of soil conservation and pollution control measures to be installed. Development should achieve no net increase in pollution of downstream waters.

Existing Vegetation - Location, condition, species and crown size of significant growth, e.g. trees 3m in height, rainforest, sedge lands, wetlands, etc. and trees on adjoining land within 3m of development.

New Building/Structure Location The proposed new structure is to be shown together with setbacks from all affected boundaries (minimum of two setbacks) and its proximity to any easements, mains, etc.

Elevations and Sections and External Finishes - Notes re external finishes: materials of constructions of the external walls of building, roofing materials, types of doors and windows, balcony railing, paving materials, driveway material.

Floor Area - means floor space as defined in Council's Planning Instruments: i.e., gross area. An offset dimension of all external walls is to be shown. A floor plan for each level of the building showing uses of each room, window and door placements is to be shown and to be fully dimensioned.

Floor Space Ratio - means the ratio of total floor space as defined divided by the site area of the land.

Dwelling Area - means the gross floor area of the individual unit/dwelling. A floor plan of each dwelling type, with uses of each room, window and door placements is to be shown and fully dimensioned.

Number of Employees/Hours and Days of Operation - Detail the number of employees proposed and the hours and days of operation of the proposal.

Acoustic Report - To be prepared by an acoustical engineer with qualifications and experience suitable for membership of Association of Australian Acoustical Consultants.

Shadow Diagrams - Required for development of two or more storeys in the Rural Village zone. The information should be shown on a site plan at a stated scale, showing the outline of the proposed building, levels to A.H.D. of the corners of buildings, ridge level and ground levels, the location of buildings on adjoining and/or adjacent lands affected by shadow and locations of the living areas of these buildings.

Roadwidths/Laneways/Existing Kerb and Guttering - Widths of all roads and laneways adjacent to the development site and existing kerb and guttering are to be indicated on plan.

Lot Layout/Lot Size (subdivision) - Show lot layout using a suitable scale. All boundary lengths are to be shown in metres together with areas of each proposed lot. Each stage must have a separate plan and property description.

Extent of Cut and Fill - Areas subject to cut and/or fill and the depths of both cut and fill are to be indicated, and also the measures to be taken to retain both. All measurements are to be related to A.H.D. levels.

Clearing - Show areas to be cleared as a result of development.

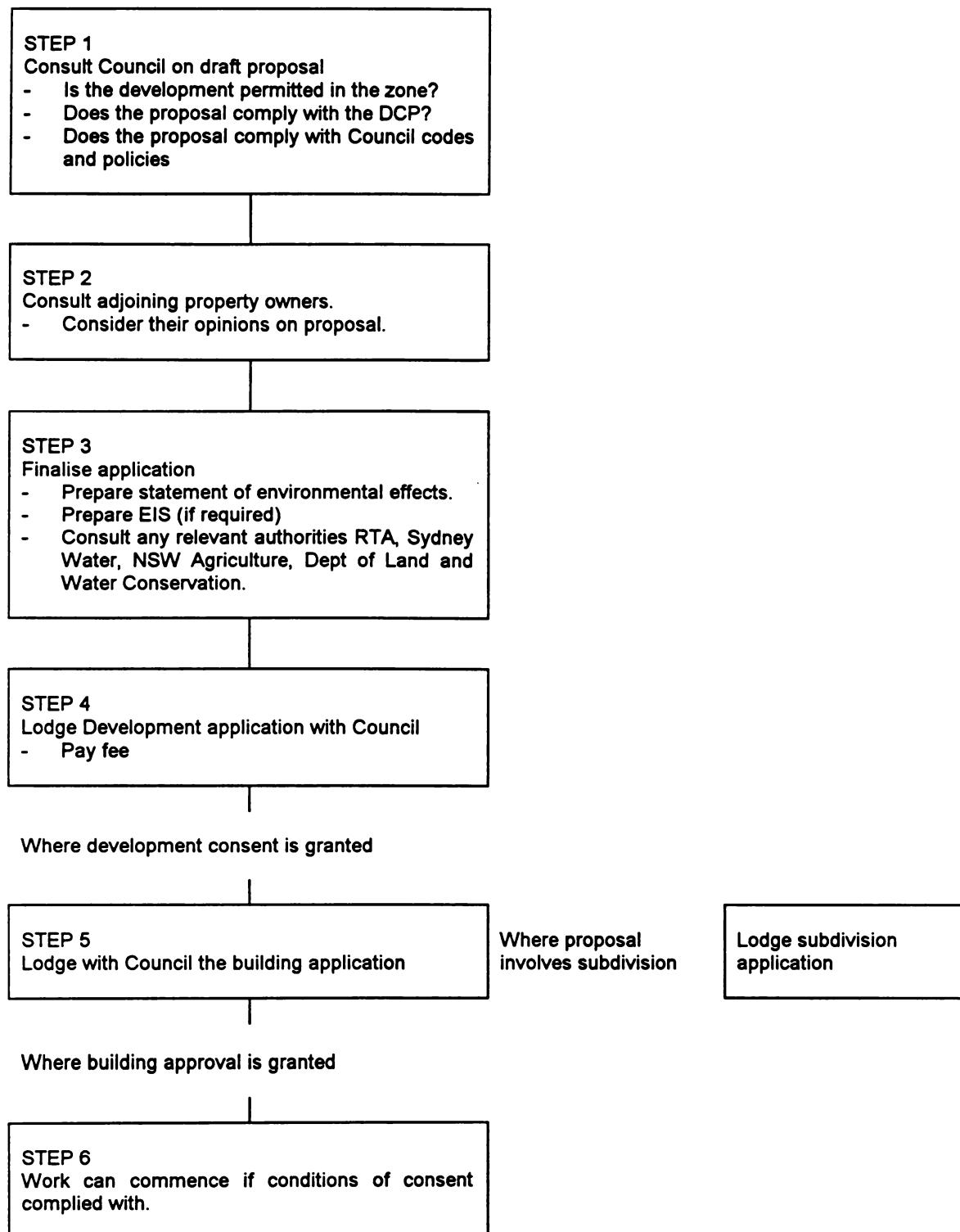
Landscape Plan - The landscape plan should express the developer's intent and ideas in a principles format only. During the building application stage this concept shall be developed into a clear and concise set of documents.

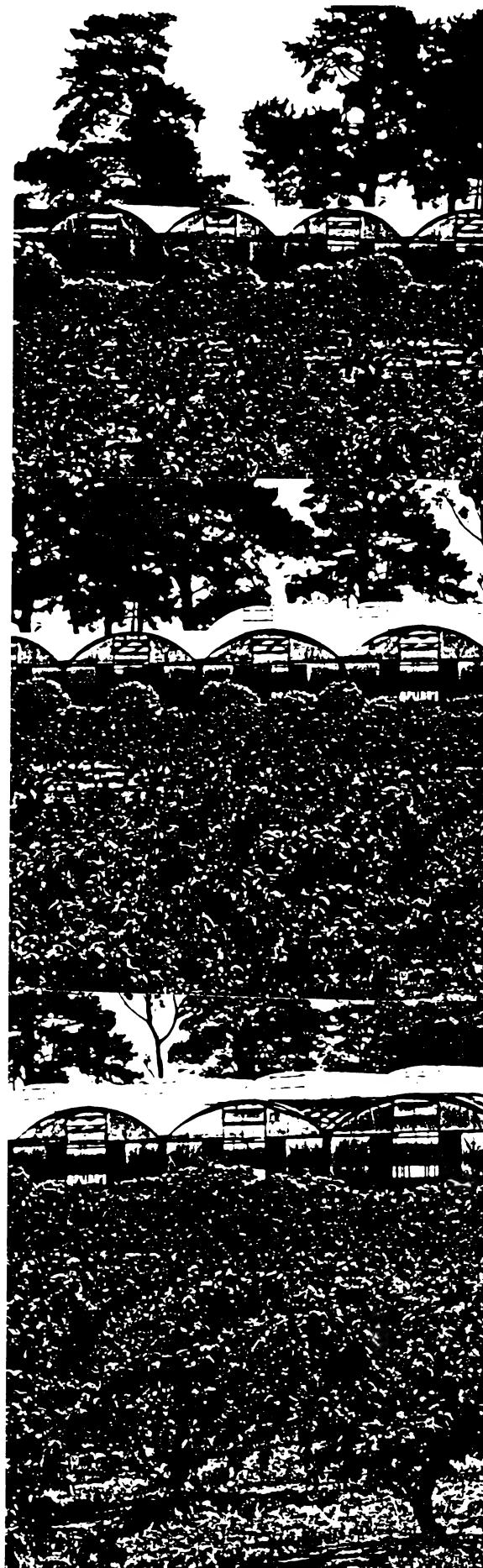
Garbage - show the area where garbage bins are to be placed.

Disposal of all waste - details are required to ensure all site waste is to be properly disposed of with minimal or nil impact on the environment.

Heritage Significance Heritage Assessment - the impact on a heritage item as included in the Hornsby Local Environmental Plan or a draft Heritage Item is to be assessed. A **Heritage Assessment** is required if the Development Application involves a Heritage Item.

Figure 2 - Development Application Procedures





Part 2 - Strategies

ENVIRONMENTAL STRATEGY

Objective

To protect and improve the water quality in the Hawkesbury River and its tributaries and provide for Ecologically Sustainable Development.

Performance Criteria

Development should conform with the principles of Ecologically Sustainable Development.

Development proposals should not proceed where they will have an adverse impact on water quality or where the impact cannot be scientifically and/or satisfactorily resolved.

Development controls should adopt a total catchment management framework with measures implemented to avoid water quality impacts in the Hawkesbury River Catchment.

Prescriptive Measures

Development proposals should be formulated and assessed in the context of Ecologically Sustainable Development, including:

- * integrating environmental, economic and social assets, dealing cautiously with risk and irreversibility (the precautionary principle), and recognising the global implications of actions;
- * seeking to improve the quality of life now and in the future in a way that maintains the ecological processes on which life depends through conservation of biological diversity and ecological integrity;
- * meeting the needs of the present in an equitable way for today's society and without compromising the ability of future generations to meet their own needs;
- * fostering sustainable economic growth and economic systems which are resilient in the face of change; and
- * providing a healthy living environment for both humans and natural ecosystems.

Development proposals should also be formulated and assessed in the context of total catchment management, including:

- * the conservation, sustainable use and management of the Hawkesbury River Catchment including soil, water and vegetation;
- * ensuring the continuing stability and productivity of the soils, a satisfactory yield of water of high quality and the maintenance of an appropriate protective and productive vegetative cover; and
- * ensuring that land within the Hawkesbury River catchment is used within its capability in a manner which retains as far as possible, options for future use.

POPULATION STRATEGY

Objectives

To limit population growth in the area in recognition of the transport, servicing and environmental constraints.

To protect existing and potentially productive agricultural land and environmentally sensitive land from the pressures of population growth.

Performance Criteria

The preference for appropriately serviced population growth in other areas of the Sydney Region as depicted in regional population strategies should be recognised.

Physical and socio-economic constraints to population growth and related development should be recognised and population growth limited.

Prescriptive Measures

The population within the rural lands of Hornsby Shire should be restricted to levels which will maintain the current level of service provision.

Population growth should be controlled through density provisions.

RURAL STRATEGY

Objective

To maintain the rural character of the area and promote the conservation and proper management of existing or potentially productive agricultural land.

Performance Criteria

Population growth in the rural areas should be constrained and sustainable agriculture principles promoted to avoid the fragmentation and sterilisation of existing or potentially productive agricultural land.

Land uses should be encouraged that are compatible with rural character to protect and enhance the agricultural and visual landscapes which are an attraction for visitors and residents.

Sustainable Agriculture and ancillary uses should be encouraged to increase employment opportunities and promote the economic viability of agricultural uses.

Planning provisions should recognise the realities of living in an agricultural area and provide clear land use direction to existing and future residents.

Prescriptive Measures

Agricultural production should be provided on lands capable of sustaining agriculture.

Land with existing or potential agricultural capability should not be used for purposes which will damage or erode that capability.

Farming practices and systems should maintain or enhance other ecosystems which are influenced by agricultural activities.

Development proposals should be prepared and assessed with regard to the siting and design issues relevant to the applicable visual landscape character type.



THE STRATEGY IDENTIFIES LAND SUITABLE FOR AGRICULTURE IN THE DISTRICT & PLANS FOR THE RETENTION OF ITS POTENTIAL.

THE STRATEGY PROMOTES SUSTAINABLE AGRICULTURE, BEING THE FARMERS RESPONSIBILITY TO MAINTAIN & SUSTAIN THE VIABILITY OF AGRICULTURAL PRODUCTION OF THE PROPERTY.



THE MAIN CONTRIBUTORS TO THE VALUE OF AGRICULTURAL PRODUCTION WITHIN THE SHIRE ARE WHOLESALE NURSERIES, CUT FLOWERS, STONE & CITRUS FRUIT & VEGETABLES.

ECONOMIC STRATEGY

Objectives

To promote a range of employment opportunities within the rural area.

To promote the orderly and economic use and development of land by providing a direction for housing opportunities, business centres, tourism and cottage industry activities.

Performance Criteria

The employment generating potential of the rural lands should be recognised and encouraged.

A range of housing opportunities should be provided in accordance with the socio-economic environment and the population profile.

Opportunities for business centres, tourist facilities and cottage industries should be provided where demand exists and where they do not conflict with the agricultural resource or amenity of the area.

Prescriptive Measures

Housing should be located where services and related infrastructure are available.

Commercial precincts within the rural area should be vibrant and attractive and provide employment opportunities.

Cottage industries should be undertaken to contribute to the local economy of the rural area.

Agricultural pursuits should continue to provide a wide range of employment opportunities.

Tourism and tourist infrastructure should be increased through promotion and provision of a greater variety of tourism opportunities while protecting the natural resources that serve to attract tourists and the social environment of the area.

COMMUNITY SERVICES STRATEGY

Objectives

To promote and encourage the provision and co-ordination of community services and facilities.

To promote recreation facilities which contribute to the communities physical, social and emotional well being.

Performance Criteria

Community services and facilities should be provided in accordance with existing and future population thresholds and community preferences.

Recreation facilities should be provided at rates which recognise the potential of rural holdings to support private recreation uses.

Prescriptive Measures

Community services and recreation facilities should be located in areas with the greatest need and accessibility.

Community Services

Investigations should be undertaken in consultation with the community on the merits of providing a new regional sized community centre in a strategic location in the rural area or increasing the capacity of the existing centre at Galston.

A community meeting hall with a minimum capacity of 30 seated persons should be provided in the Canoelands district.

The role and function of Galston Library should be reviewed following the relocation and extension of Pennant Hills and Castle Hill Libraries. The review should recognise the geographical limitations imposed by the population distribution and the needs of less mobile sections of the community.

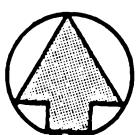
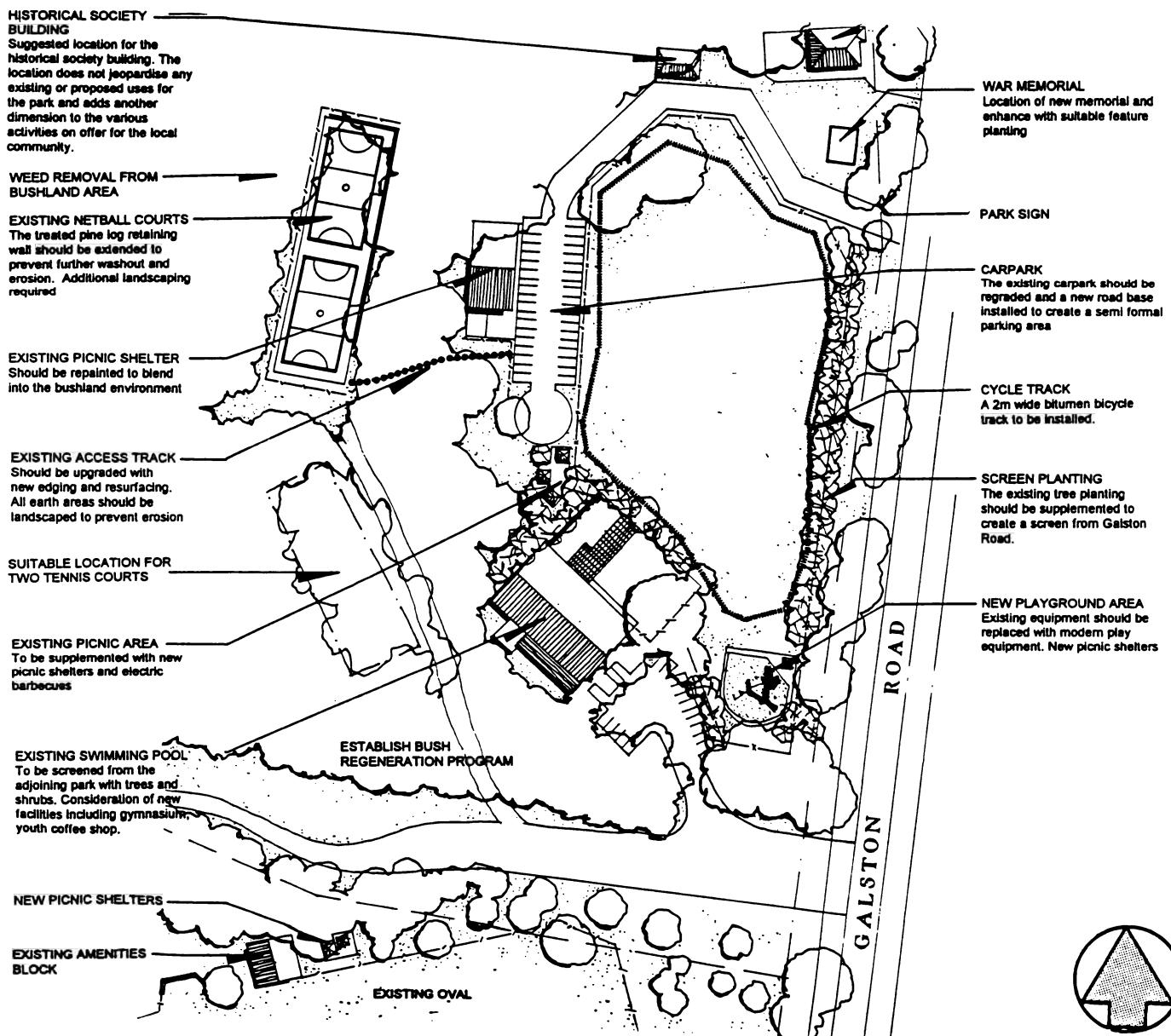
Investigations should be undertaken into extending the Galston swimming pool complex to include a gymnasium, coffee shop/cafe and an area designed to service the social needs of teenagers.

Recreation

A masterplan should be prepared for the establishment of a children's playground and neighbourhood park on land within the Galston Village Area.

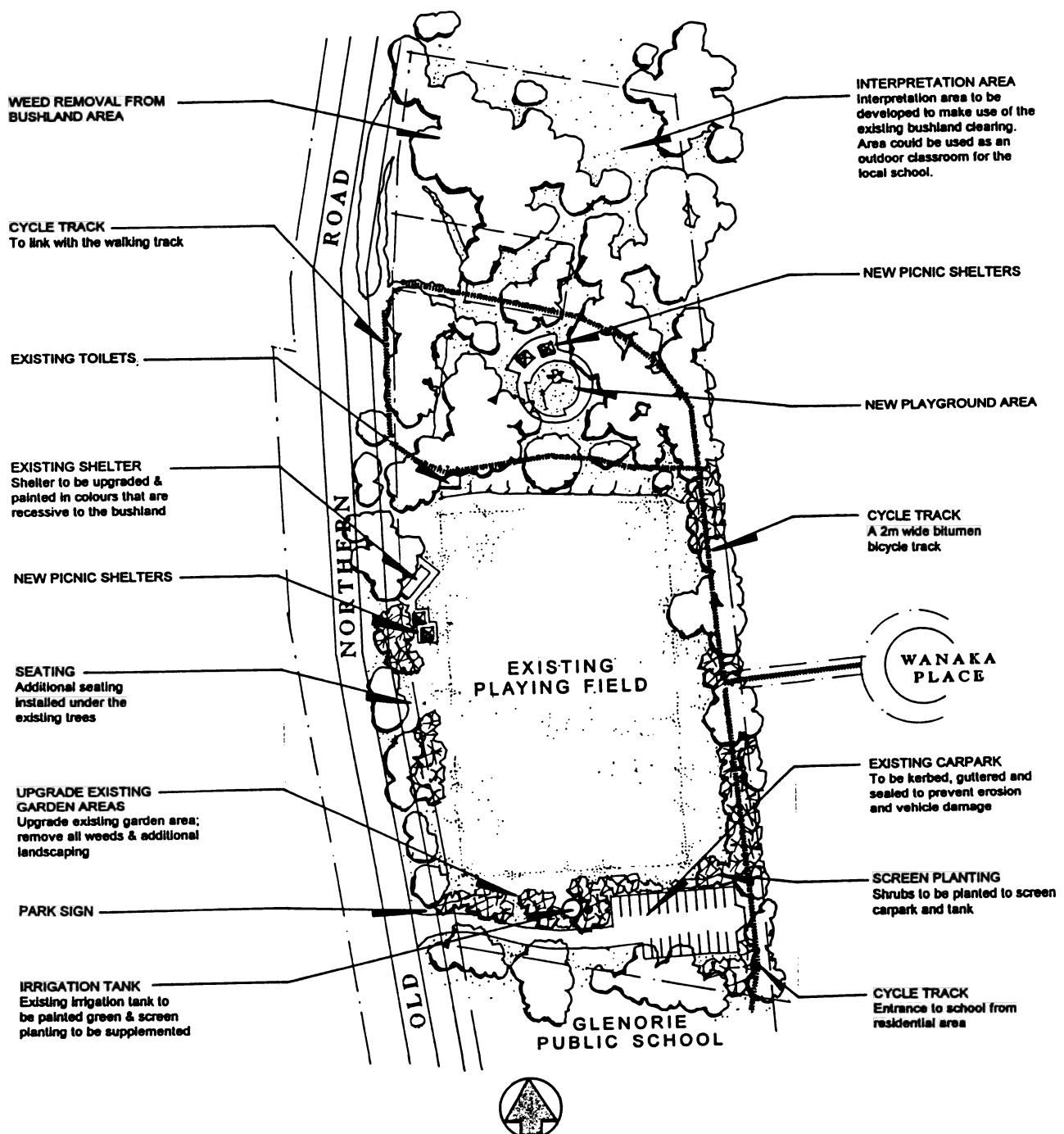
The potential to establish a small children's playground at the Porter Scenic Lookout in the Dural Village on the Baulkham Hills Shire Council side of Old Northern Road should be assessed. Investigations should also be undertaken into the potential of providing a netball/basketball court at Glenorie Oval.

A masterplan should be prepared for Galston Park with the aim of providing 2 tennis courts. Similarly, of 1 netball/basketball court and 1 or 2 tennis courts at Arcadia Park.



GALSTON RESERVE MASTERPLAN

COMMUNITY SERVICES



GLENORIE PARK
MASTERPLAN

COMMUNITY SERVICES

TRANSPORT STRATEGY

Objective

To provide for safe, convenient and efficient movement of people.

Performance Criteria

Traffic management measures should reflect the role of motor vehicles as the dominant means of transport in the rural areas of Hornsby Shire due to the population distribution and geographic isolation.

Additional public transport services should be provided where viable.

Infrastructure should be provided to promote a range of alternative travel means between village areas and recreation, community and social facilities.

Traffic and pedestrian safety measures should be provided in business precincts.

Prescriptive Measures

The population within the rural lands of Hornsby Shire should be restricted to levels which will maintain the current level of service provided by the local and regional road network.

Investigations should be undertaken to evaluate the feasibility of additional evening and weekend bus services.

Bicycle links between the residential village areas and community, recreation and social facilities should be provided where appropriate.

Bicycle paths should be well constructed, safe and not conflict with other forms of transport.

Investigations should be undertaken into the potential for the establishment of formal horse riding trails in consultation with local horse riding clubs and equestrian establishments.

The Masterplans for the Galston and Dural Village Commercial areas should include means to improve traffic flow and pedestrian safety in these commercial areas.



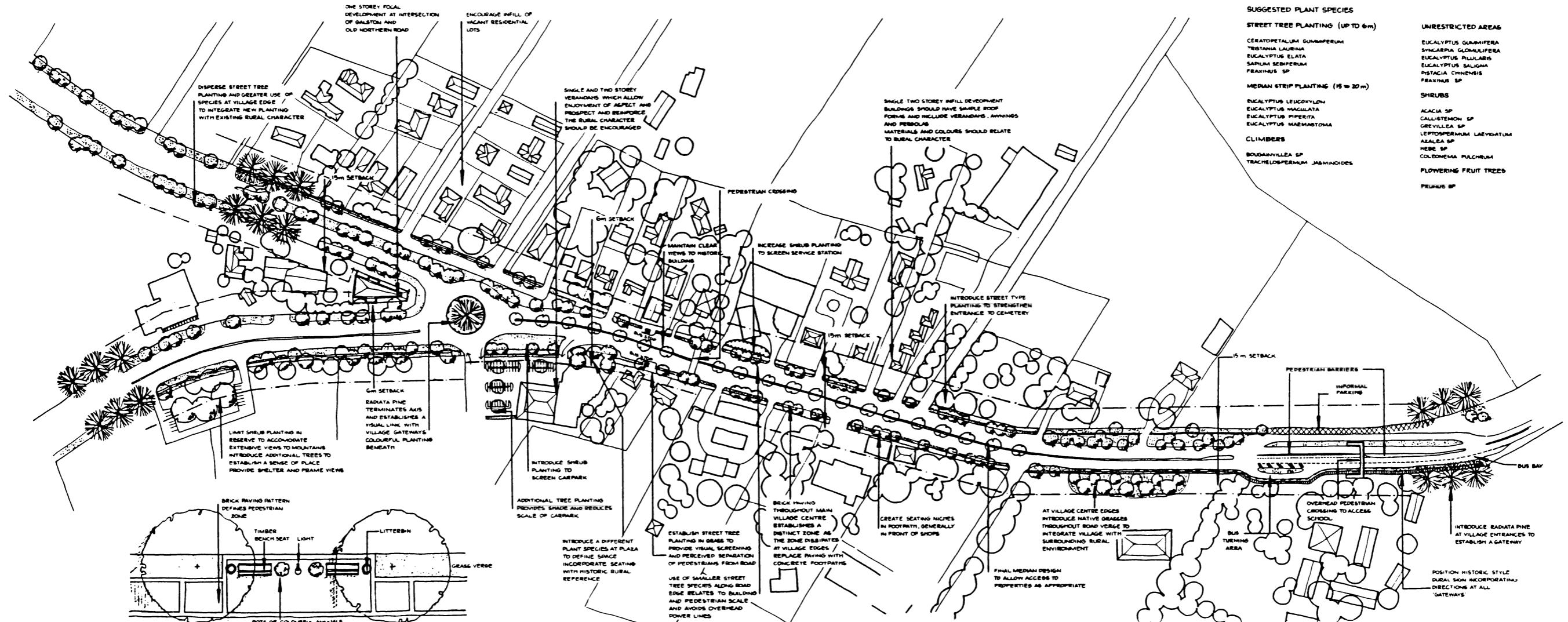
THE STRATEGY ENCOURAGES FORMALISED
HORSE RIDING TRAILS IN THE RURAL AREAS



THE STRATEGY ENCOURAGES A FORMALISED
NETWORK OF PEDESTRIAN & CYCLE ROUTES
THAT LINK DESTINATIONS SUCH AS SPORTING
FACILITIES, PLAYGROUNDS, SCHOOLS & ROUTES
TO ADJOINING AREAS.



PART ELEVATION TO EASTERN SIDE OF GALSTON ROAD AND OLD NORTHERN ROAD 1:400



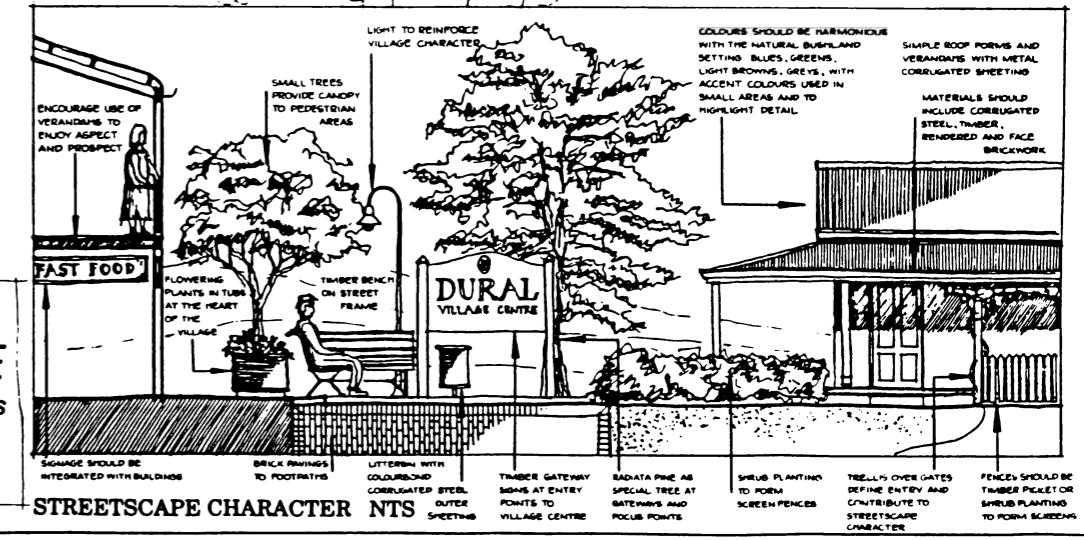
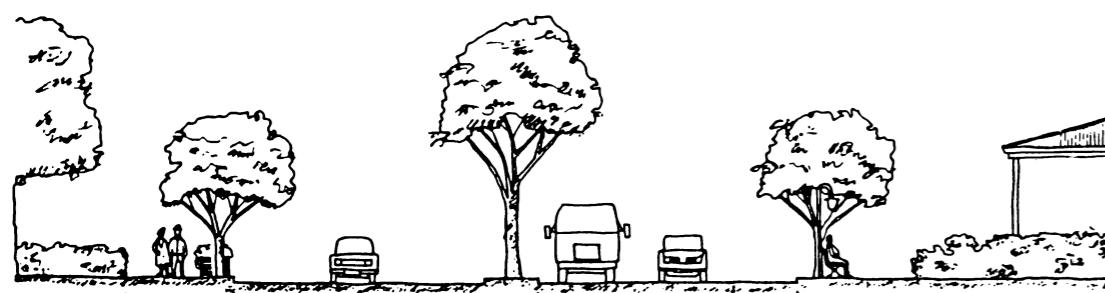
DETAIL OF TYPICAL FOOTPATH SEATING AREAS 1:100

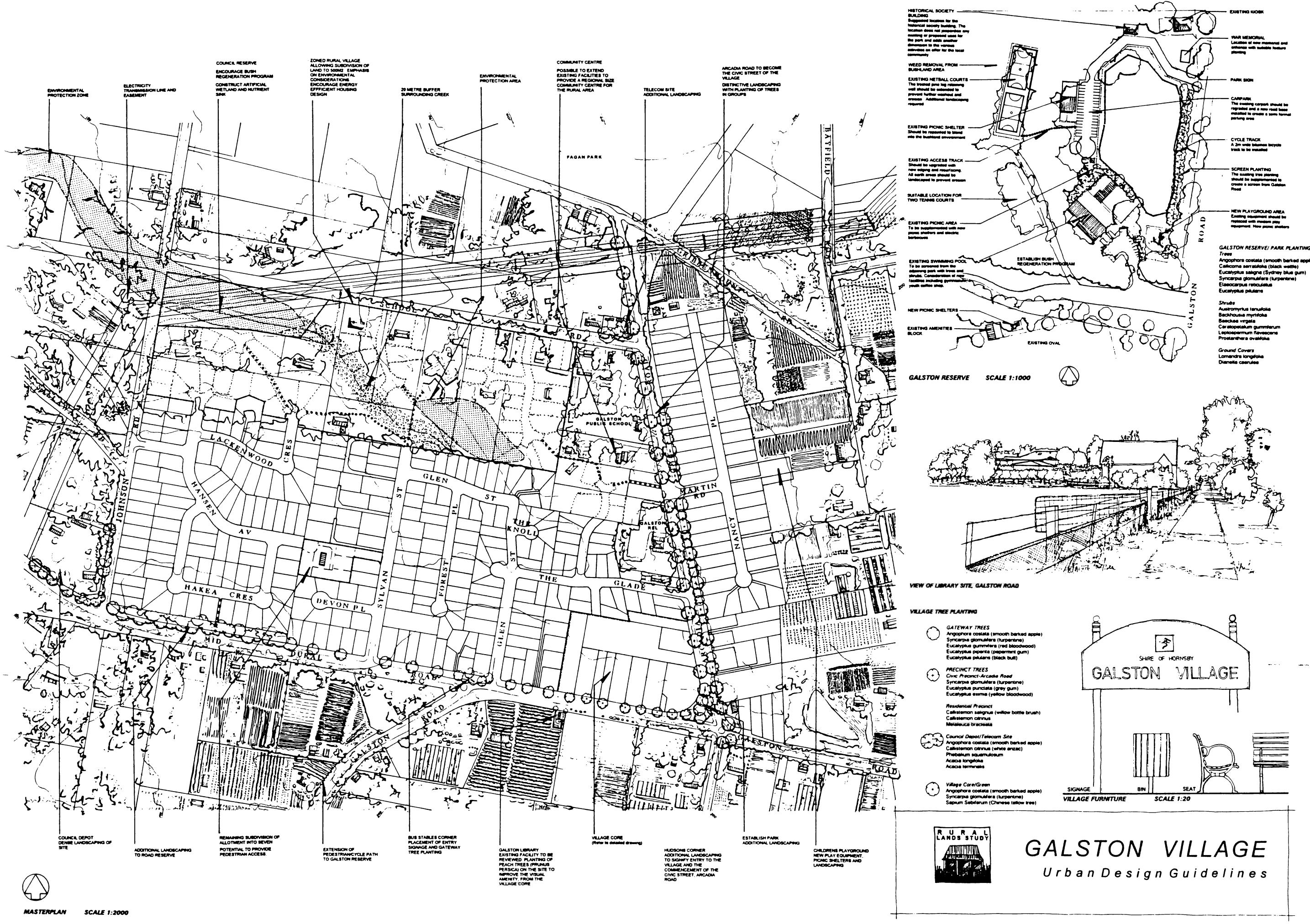
MASTERPLAN 1:1000

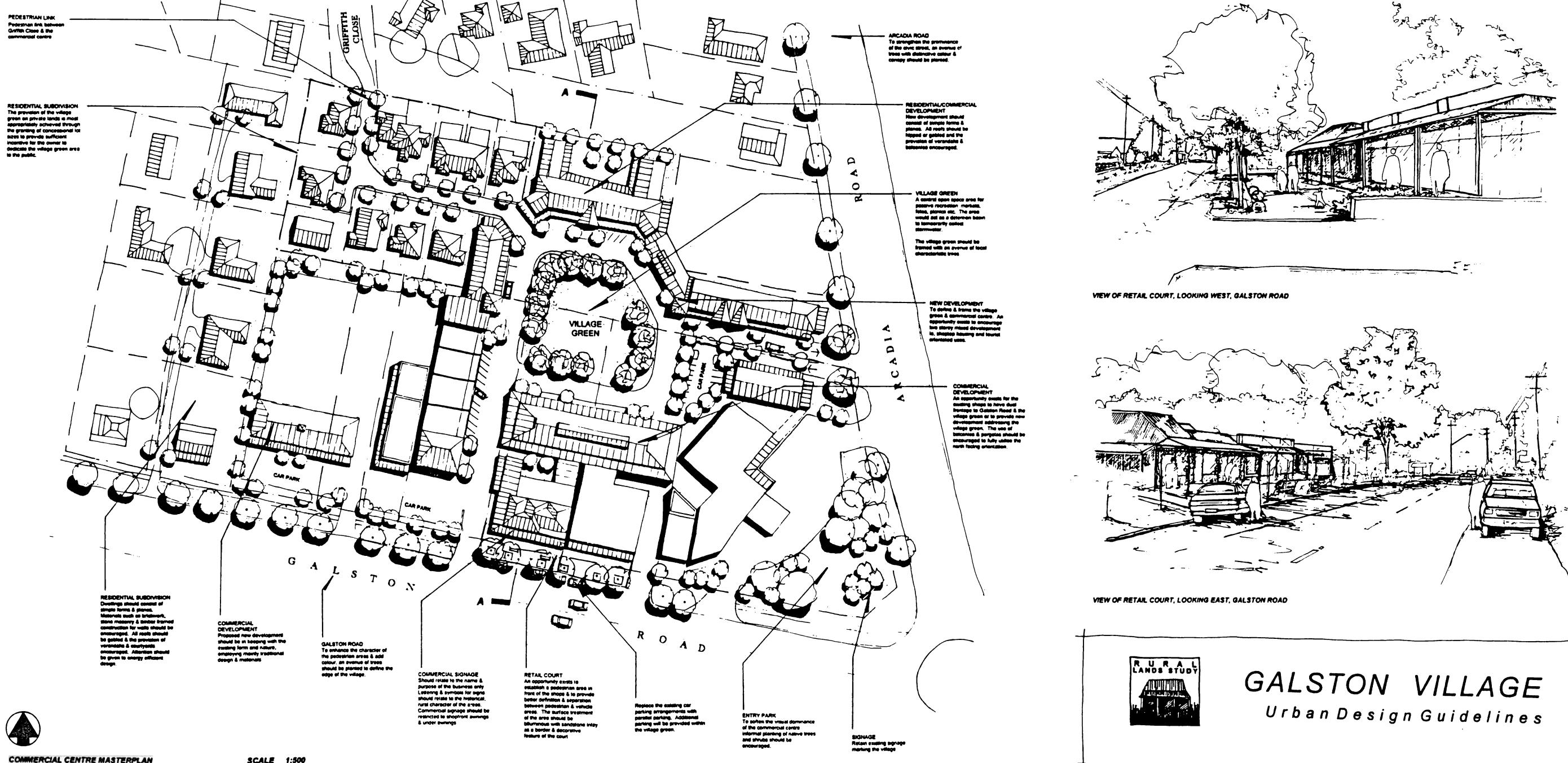
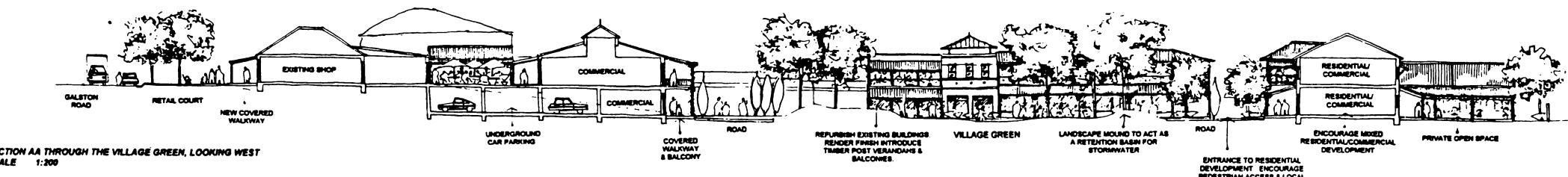
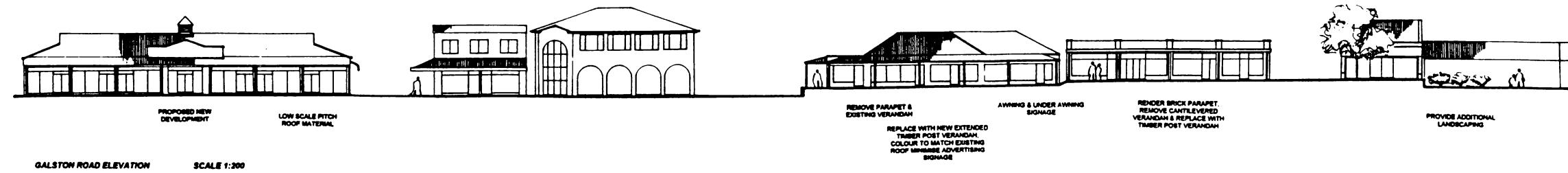


DURAL VILLAGE Urban Design Guidelines

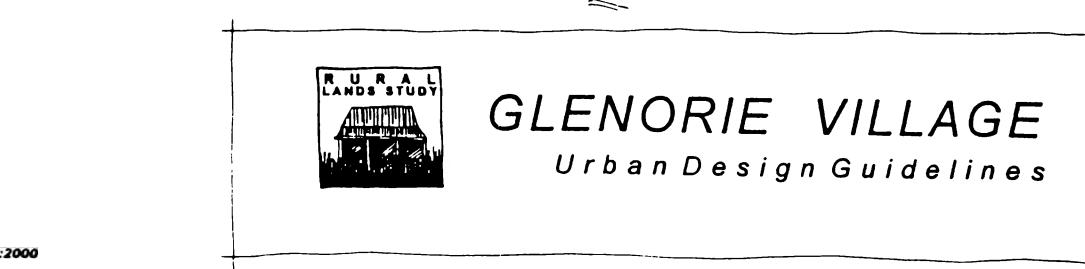
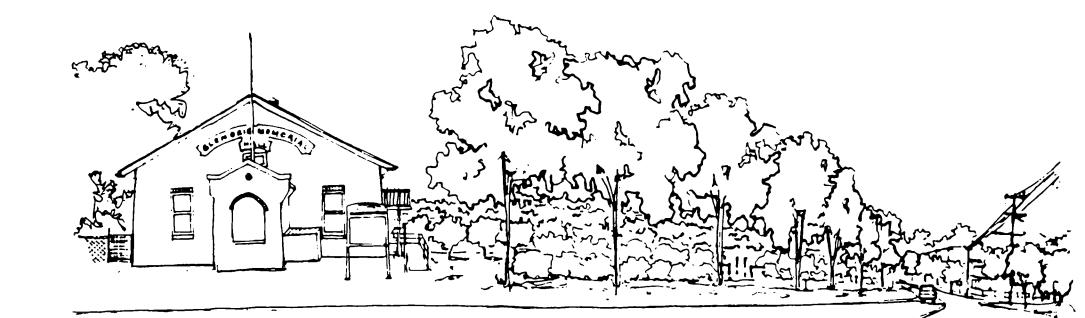
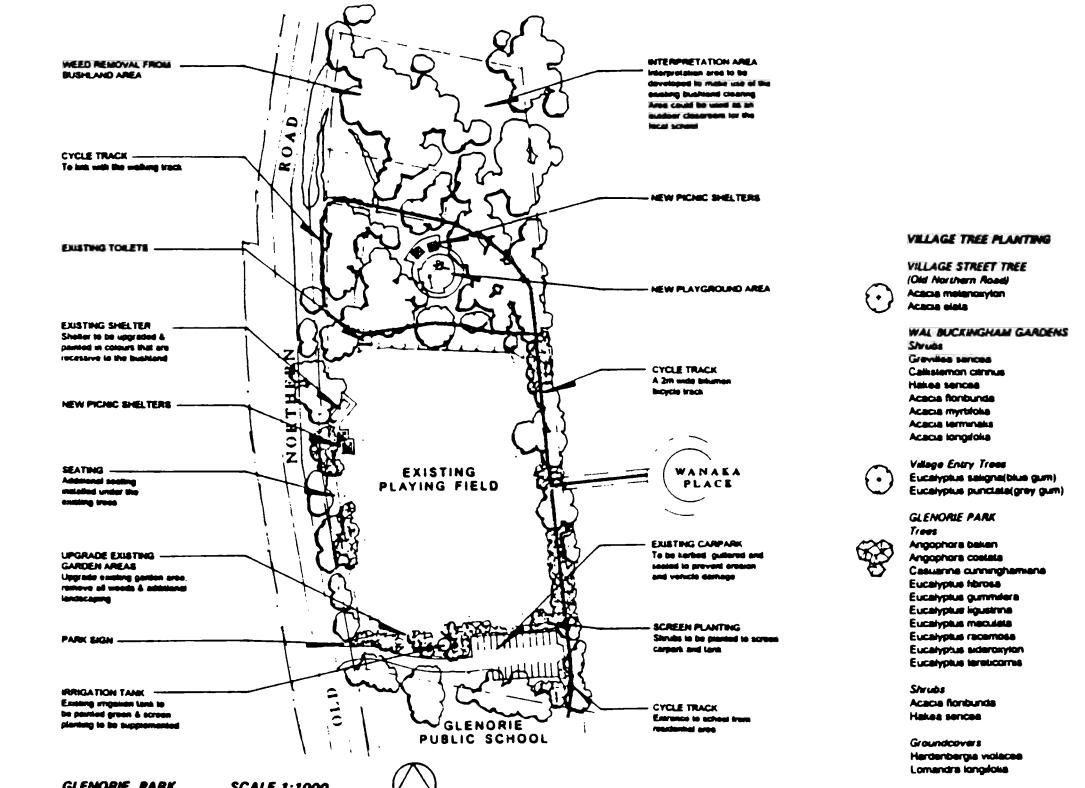
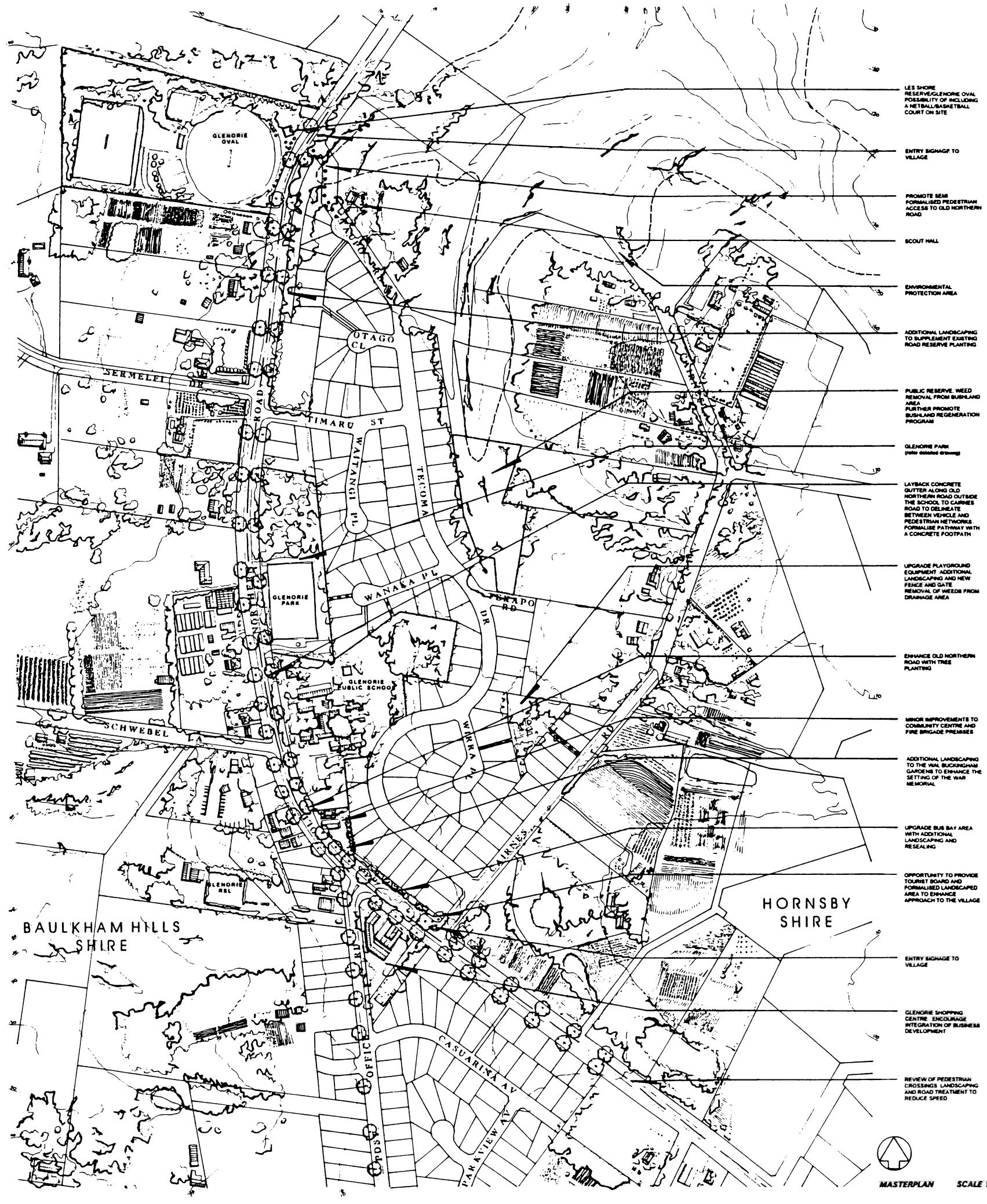
TYPICAL SECTION THROUGH OLD NORTHERN ROAD 1:100

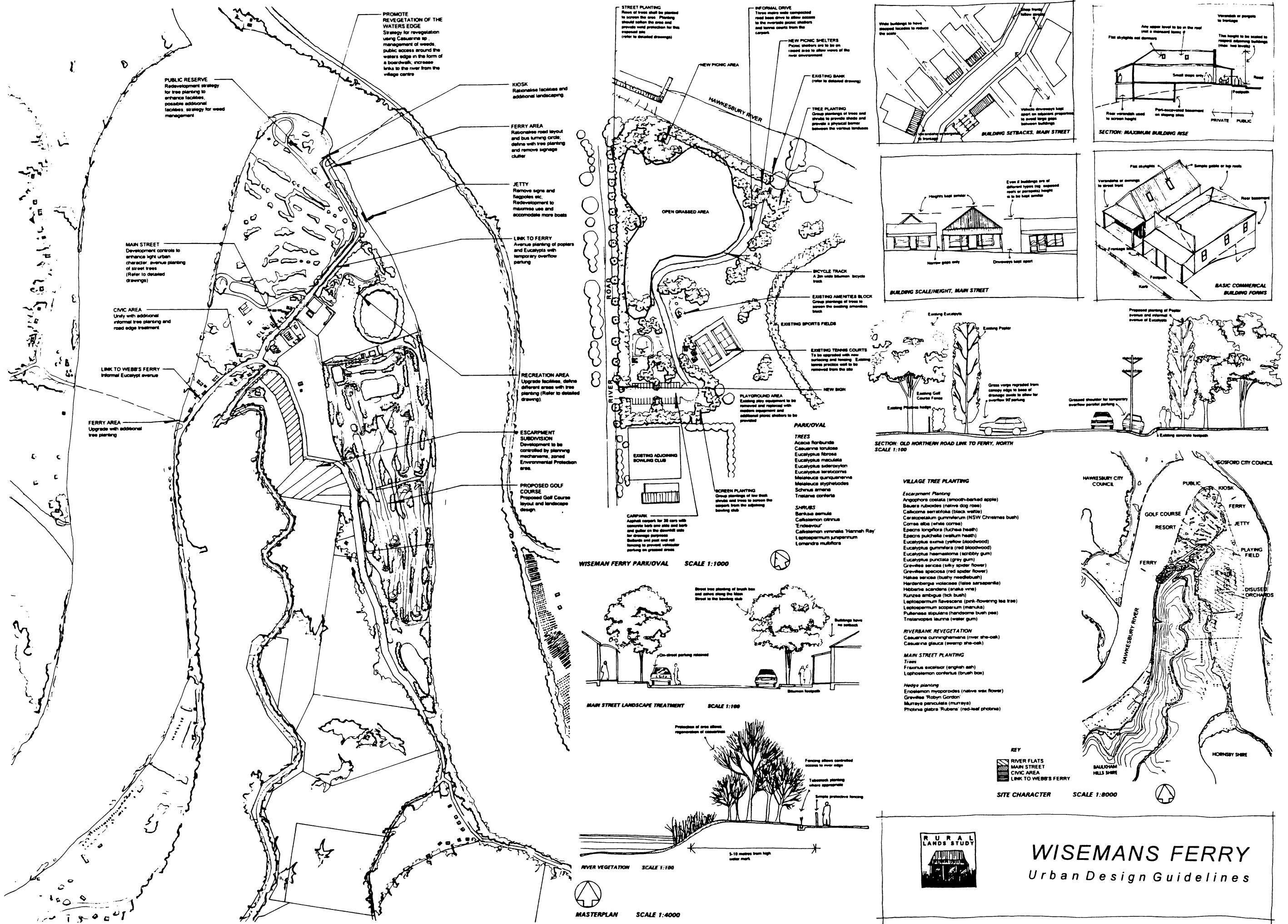


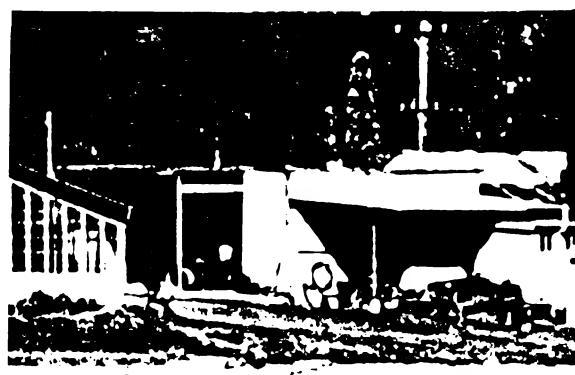




GALSTON VILLAGE
Urban Design Guidelines







Part 3 - Land Uses

LAND USES: SUBDIVISION

Objectives

To control the density of development in order to limit population growth and maintain the rural character of the area.

To promote lots of sufficient size to conduct agriculture and other rural pursuits.

Performance Criteria

Lots should be of a sufficient size to enable agricultural/rural pursuits. The area of lots and lot layout should be in accordance with the servicing capacity of the area (e.g. water, sewerage, traffic).

The density of allotments should retain the rural character of the area and avoid elements of an urban nature.

Lots sizes should be compatible with the character of the surrounding area.

Lot sizes and lot layouts should be consistent with the potential agricultural productivity and environmental constraints of the area (e.g. topography, bushland, water courses).

Prescriptive Measures

Lots should be able to accommodate a building envelope of 200m² with a minimum dimension of 10m located a minimum of 4m from significant trees and other significant landscape features.

Lots should be designed to maximise usable areas of the site and have regard for the topography.

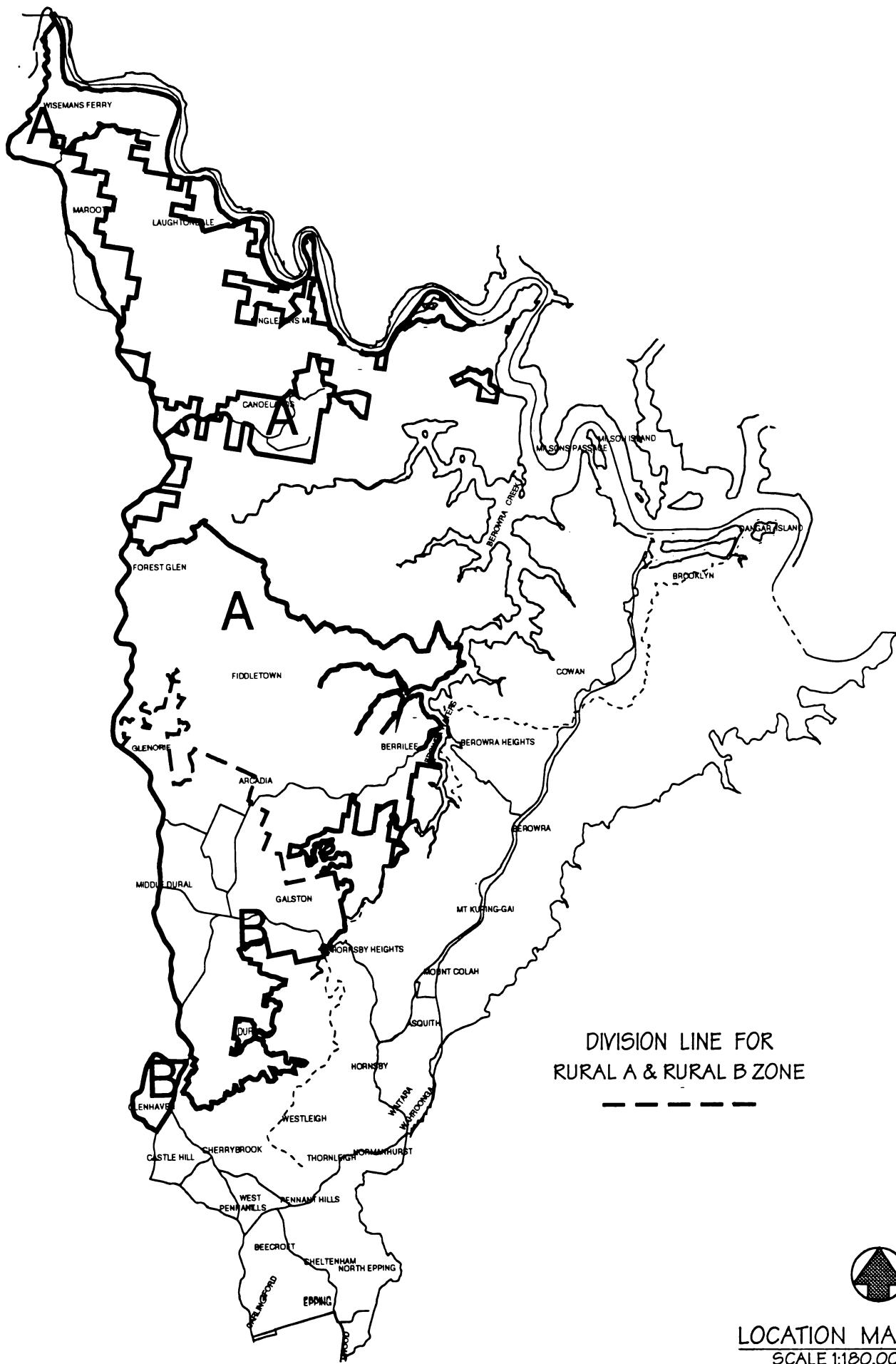
Subdivision design should provide opportunity for the retention of significant landscape features including rock outcrops, water elements, appropriate location of boundary lines and building envelopes.

In calculating the area of a battle-axe or hatchet shaped allotment, the accessway should be excluded. The area of an allotment affected by a "right of carriageway", battle-axe handle or private road should also be excluded.

In calculating the area of an allotment zoned part Residential/Rural and part Environmental Protection, the area of the land zoned Environmental Protection should be excluded.

Minimum lot sizes should comply with the following table.

Rural AA (Large Holdings - Agricultural Landscapes)	10ha
Rural AE (Large Holdings - Extraction)	10ha
Rural AR (Large Holdings - Rural Landscapes)	10ha
Rural BA (Small Holdings - Agricultural Landscapes)	2ha
Rural BR (Small Holdings - Rural Landscapes)	2ha
Residential AR (Low Density - Rural Village)	500m ²
Environmental Protection A (Wetlands)	40ha
Environmental Protection B (River Catchment)	40ha
Environmental Protection C (Tourist)	0.1ha
Environmental Protection D (Recreation)	5ha

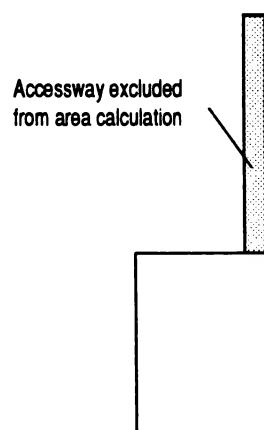


DIVISION LINE FOR
RURAL A & RURAL B ZONE

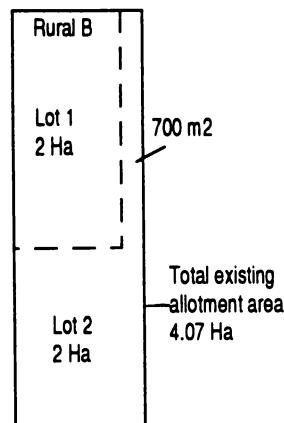


LOCATION MAP
SCALE 1:180,000

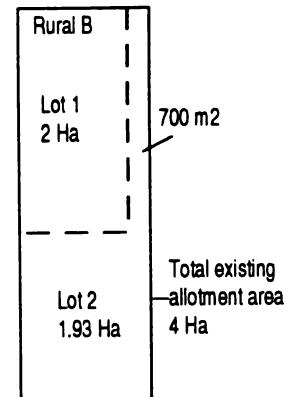
SUBDIVISION



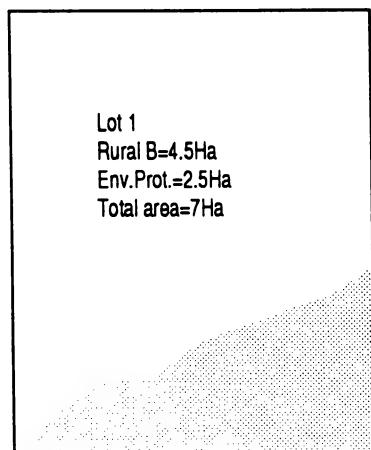
Battle-axe or
Hatchet Allotment



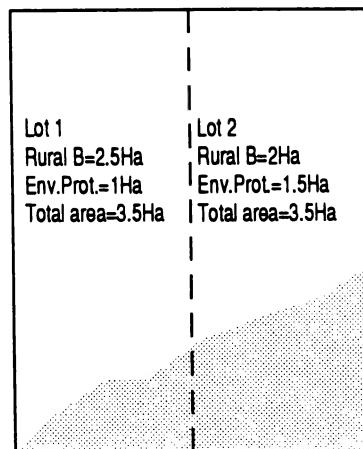
Complying Subdivision



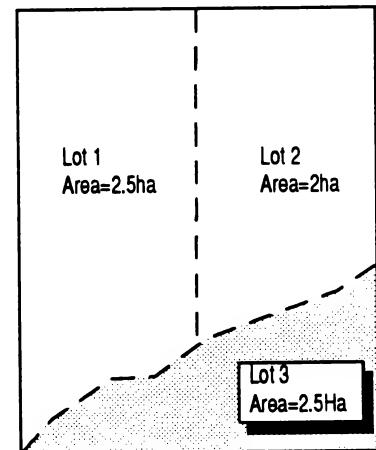
Non Complying Subdivision



Existing allotment



Complying subdivision



Non complying subdivision



Rural B



Environmental Protection

SUBDIVISION

LAND USE: ATTACHED DWELLINGS

Objectives

To provide opportunity for alternative forms of housing which maintain the appearance of a single building.

To promote housing design that enhances the character and amenity of the area and has regard for the topography.

Performance Criteria

The design of buildings should complement the rural character of the area.

The design of attached dwellings should maintain the appearance of a single building.

The design of buildings should be sympathetic to the topography and other natural features of the land.

Prescriptive Measures

Development should be consistent with the dominant rural setting of the immediate area, including roof pitch, colours, materials, textures and window placement.

The following components of a streetscape are to be considered to ensure new buildings are in keeping with established rural character:

- * front setback of dwellings
- * materials, textures colours
- * scale of buildings, height, bulk
- * roof form, pitch
- * landscaping, garden treatment
- * spaces between buildings, rhythm
- * facades, window placement
- * heritage themes
- * fences
- * driveways
- * balance between solid walls and openings

The design of attached dwellings should avoid elements of symmetrical design and look like a single dwelling from all elevations.

The design of buildings should relate to the slope of the land to minimise earthworks and disturbance to the land (cut and fill) and to contribute to the reduction of the waste stream.

Effluent and other waste water should be able to be disposed of in a manner acceptable to Council.

Attached dwellings should be attached by a common wall, ceiling and floor.

Note: Attached dwelling means: a dwelling attached to another dwelling by a common wall or ceiling or floor where the dwellings maintain the appearance of a single building and where not more than two dwellings are erected on the same allotment of land.

The creation of separate titles, torrens, strata or community, is not permissible for this type of development.

LAND USE: RURAL WORKERS' DWELLINGS

Objectives

To promote the use of land for agricultural production by providing on site accommodation for rural workers.

To ensure that the erection of a rural workers' dwelling is for a bona-fide rural operation and maintains the rural character of the area.

Performance Criteria

Rural workers' dwellings should only be constructed where rural undertakings on the property have the capacity to support both the farmer and the rural worker.

The size, design and colour of rural workers' dwellings should be compatible with its purpose and the surrounding area.

Rural workers' dwellings should be of a temporary nature to reflect the dynamic nature of agricultural land use.

Prescriptive Measures

Rural workers' dwellings should only be provided where there is a genuine need to accommodate a rural worker.

Rural workers' dwellings should not affect the capability of land used for agriculture.

Rural workers' dwellings should not have a gross floor area greater than 110m²

The design of rural workers' dwellings should incorporate elements which are compatible with surrounding development and respect the rural character and scenic qualities of the area.

Rural workers' dwellings should be removed from the land if they are not occupied for a continuous period of 6 months by a rural worker who is principally employed in rural occupation on the subject land. Where seasonal employment is involved consideration will be given to an extended period.

Proposals for a rural workers' dwellings should be accompanied by:

- (a) a site plan showing the nature and extent of agricultural undertakings on the land;
- (b) a detailed description of the agricultural undertakings on the land which should include:
 - the calculated area of the site used for each agricultural activity;
 - the rural workers' hours of employment; and
 - the number of people employed, and on what basis (e.g. full-time, part-time, casual, seasonal).
- (c) gross margin budgets or accounts which demonstrate the ability of the established enterprises to support both the farmer and the rural worker.

Note: A rural worker's dwelling should be a movable dwelling which is defined as: "a dwelling which is:

- (a) a self-contained dwelling which includes at least one kitchen, bathroom, bedroom, living area and toilet and laundry facilities;
- (b) manufactured off-site in one or more major sections and transported to a site for installation; and
- (c) capable of being placed on and removed from a site within 24 hours, but does not include caravans, mobile homes and the like."



THE DWELLING SHOULD BE OF A TEMPORARY NATURE THAT
REFLECTS THE NATURE OF AGRICULTURAL LAND USE

RURAL WORKER'S DWELLING

LAND USE: AGRICULTURAL AND RURAL STRUCTURES

Objectives

To ensure that the location of rural sheds is sensitive to the character and amenity of the area.

To ensure that rural sheds do not impact upon the visual environment of the area.

Performance Criteria

The location, materials and colours of rural sheds should enhance the quality and character of the rural area and be sympathetic to the topography and other natural features of the land.

Rural sheds should be designed to integrate with the streetscape and complement the rural character of the area.

Prescriptive Measures

Rural sheds should be in keeping with the established rural character. Large sheds that may impact upon the streetscape should be setback from the street. Generally, sheds should be setback further from the street than the main residence and where there are multiple structures these should be clustered together.

Sheds should be located in areas where minimal earthworks and disturbance to the land (cut and fill) will be incurred.

Size

Rural sheds that have a floor area greater than 200m² and/or have a height greater than 5.0m from natural ground level to the ridgeline, require development consent.

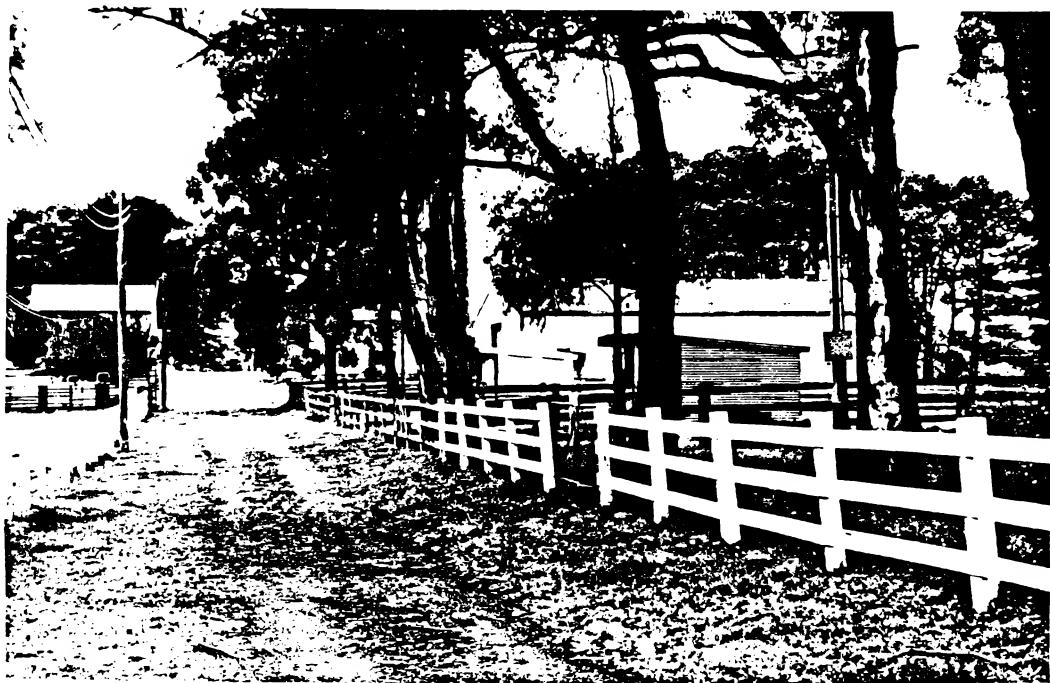
Proposals for rural sheds should be accompanied by documentation indicating their intended usage.

Colours and Materials

The colours used in the construction of rural sheds should be consistent with the dominant colours of the rural area and surrounding bushland (i.e. greens, browns, greys etc).

The materials of rural sheds should be compatible with the character of the rural lands, and where possible should consist of traditional materials that are consistent with the area or which reflect local precedents.

Rural sheds should be located where they will have minimum impact on the potential use of the land for agriculture.



RURAL STRUCTURES SHOULD BE SENSITIVE
TO THE CHARACTER & AMENITY OF THE AREA



STRUCTURES SHOULD BE WELL SETBACK FROM
THE ROAD & SCREENED BY THE USE OF CROPS

LAND USE: DAM CONSTRUCTION

Objective

To ensure that water storage structures are stable and have minimal environmental impact.

Performance Criteria

Dams should be constructed in suitable locations in a manner that ensures stability and minimal environmental impacts.

The dam capacity and spillway size should be proportional to the catchment area.

Dams should not prevent or significantly alter water flows to adjoining properties or natural ecosystems.

Prescriptive Measures

Dams should not be situated on sites with a gradient in excess of 15%.

Dam spillways should be located and designed to handle major storm flows safely. Surplus water flows should leave the property in the same place that they did before the dam was built.

Dam construction should provide for at least 1m free board (height from the top of the water level to the crest).

The dam wall should be built in layers to obtain adequate compaction. Rocks greater than 75mm in size and vegetative matter are unsuitable materials and should not be used in dam construction.

Topsoil from the dam site should be stockpiled during construction and respread over the dam wall, spillway and other disturbed areas upon completion. The topsoil should be immediately seeded with indigenous groundcover species to promote stabilising vegetation. Trees should not be planted on the dam wall.

Excavated material should not be transported off-site.

Consideration should be given to maintaining the flow of runoff to downstream areas.

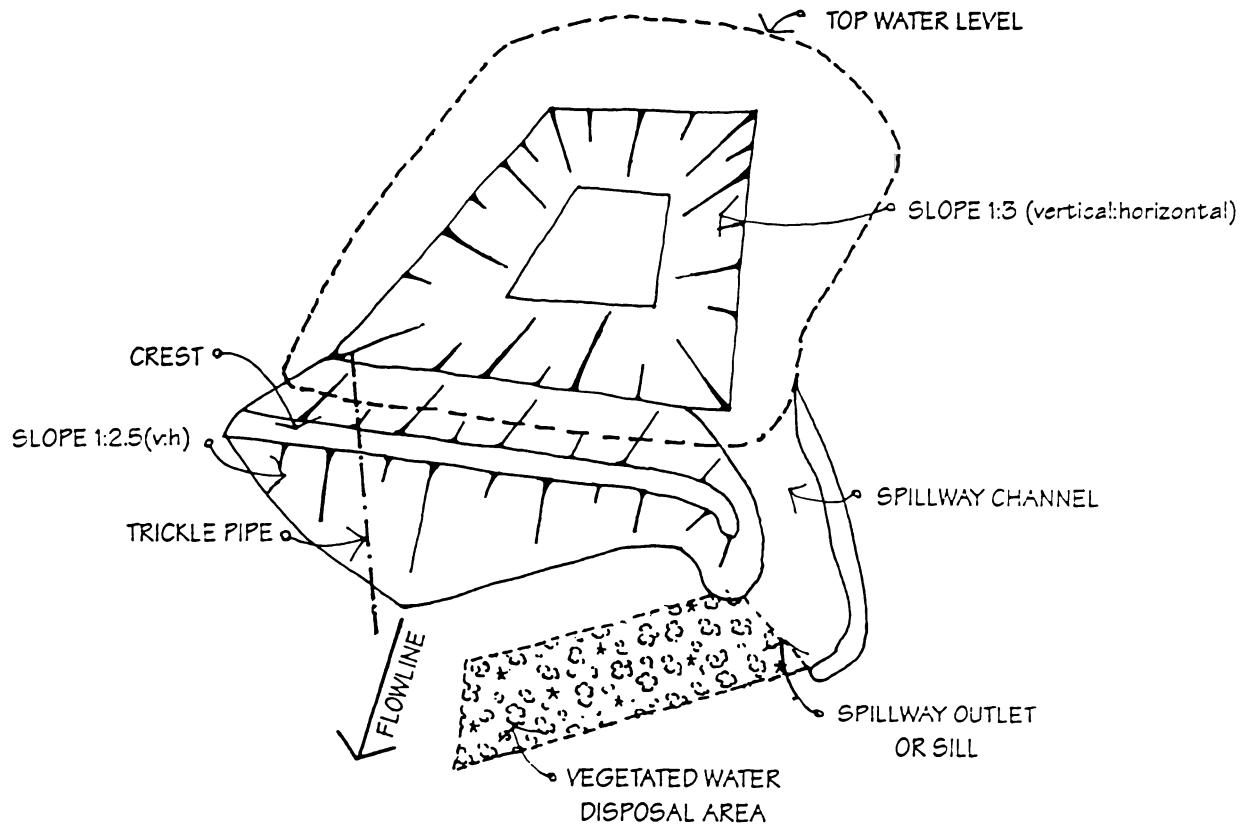
Measures should be taken to prevent polluted water entering the dam, and to remove pollution from the dam water. Polluted water should not leave a dam to a watercourse or bushland and should be treated by removing nutrients through the use of plants or irrigating crops and pastures.

A licence from the Department of Land and Water Conservation may be required for dams located on watercourses and either used for irrigation or for stock and domestic purposes. Excavations within 40m of a watercourse also require a licence from the Department of Land and Water Conservation.

Requirements for sediment control dams associated with extractive industries can be found in Council's Extractive Industries DCP.

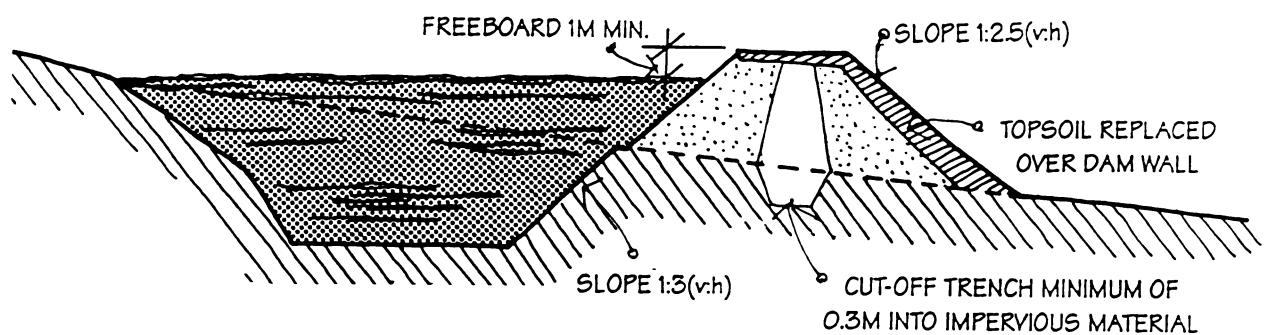
Note: Further advice on dam construction is contained within the Department of Land and Water Conservation Management guidelines "Building a farm dam". Large dams may require the preparation of an Environmental Impact Statement (refer Appendix A).

For sediment and erosion control guidelines refer to element "Soil and Water Management"



PLAN VIEW OF DAM

CREST WIDTH
3M MIN.



CROSS-SECTION THROUGH DAM

Catchment area (Ha)	Channel width (m)	Outlet or sill width (m)
<20	3	7
20-40	6	12
>40	(Need to be designed)	(Need to be designed)

RECOMMENDED MINIMUM SPILLWAY SIZES FOR STABLE SOILS

DAM CONSTRUCTION

LAND USE: ROADSIDE STALLS

Objective

To ensure that roadside stalls are constructed in a manner that is in keeping with the rural character of the area.

Performance Criteria

Produce grown on-site may be sold at the frontage of a property in a manner in keeping with the character of the area.

Access and parking should be provided in a safe manner.

Prescriptive Measures

Only produce produced on the property should be sold at a roadside stall.

Any foodstocks sold should be stored and displayed in a hygienic manner. The sale of foodstuffs is subject to the Food Act and Regulations 1989.

Roadside stalls should be erected within the property boundary and should not exceed an area of 20m².

Proposals should demonstrate suitable means for the disposal of food wastes.

Roadside stalls should be constructed of materials of a lightweight nature.

Temporary advertisements promoting the sale of produce may be erected in conjunction with a roadside stall. Advertisements should be attached or adjacent to the roadside stall within the property boundary.

Access and parking areas should have sufficient area not to disrupt the flow of traffic.

Note: Roadside stall means "a building or place (not exceeding 20m² in floorspace or area) where only primary products produced on the property on which the building or place is situated are exposed or offered for sale or sold by retail."

LAND USES: HOME INDUSTRY, HOME OCCUPATION, RESIDENTIAL OFFICE

Objectives

To ensure that low intensity business activities are conducted in a manner in keeping with the rural environment.

Performance Criteria

Local employment opportunities should be provided throughout the rural area.

Home industries, home occupations and residential offices should be in keeping with the rural environment and not impact on the amenity of adjacent properties.

Prescriptive Measures

Home industries should:

- (a) be undertaken by the permanent residents of the dwelling;
- (b) not involve the employment of more than 3 persons other than those residents; and
- (c) not interfere in any way with the amenity of adjoining properties or the locality in which the dwelling is situated; and
- (d) not occupy an area of more than 200m²; and
- (e) not involve the exhibition of any notice, advertisement or sign (other than a notice or sign which would fit within a rectangular figure 1.2 metres in length and 0.6 metres in height and exhibited on that dwelling or land to indicate the name and occupation of the resident);

Residential offices should comprise an occupation carried on by the permanent residents of the dwelling and should not involve:

- (a) the employment of more than 3 persons other than the permanent residents;
- (b) interference in any way with the amenity of adjoining properties or the locality in which the dwelling is situated;
- (c) the exhibition of any notice, advertisement or sign (other than a notice or sign which would fit within a rectangular figure 1.2 metres in length and 0.6 metres in height and exhibited on that dwelling or land to indicate the name and occupation of the resident);
- (d) exposure to view from any public place of any matter, except as provided by paragraph (c);
- (e) a change in the appearance of the dwelling or the land on which it is erected out of character with that of the adjoining land;

Home occupations should comprise an office or business and:

- (a) be carried on only within the external walls of the dwelling; and
- (b) be undertaken by the permanent residents of the dwelling; and
- (c) not involve the employment of persons other than those residents; and
- (d) not interfere in any way with the amenity of adjoining properties or the locality in which the dwelling is situated; and
- (e) not occupy an area of more than 50m²; and
- (f) not involve the exhibition of any notice, advertisement or sign (other than a non-illuminated notice or sign which would fit within a rectangular figure of 0.5m² and exhibited on that dwelling to indicate the name and occupation of the resident); and
- (g) not involve exposure to view from any public place of any matter other than any such notice, advertisement or sign; and
- (h) the use does not involve the selling of any items from the premises;

Note: A use which complies with the definition of home occupation does not require development consent.

LAND USES: KEEPING OF ANIMALS AND ANIMAL BOARDING OR TRAINING ESTABLISHMENTS

Objectives

To ensure that animals are kept in a healthy and safe manner.

To ensure that the keeping of animals and the associated activities do not impact on surrounding residents or the environment.

Performance Criteria

Animals should be kept in a healthy and safe manner.

The keeping of animals should not impact upon surrounding residents by way of noise, odour or runoff.

Animals should be kept in a manner that is in keeping with the land capability and that does not impact upon the environment of the property or surrounding area.

Animal accommodation and related structures should be sympathetic to the rural character of the area and not impact upon the rural landscape.

Car parking and loading and unloading facilities should be provided in accordance with projected needs and not impact upon the character of the rural area or adjoining residents.

Prescriptive Measures

Animals should be kept in a manner that will not create a nuisance or be dangerous or injurious to health.

Animal stocking rates should be in accordance with the land capability of the property. Stocking rates should take into account the effect of the animals upon the soils and environment and determined irrespective of the means of feeding the stock.

Yards should be enclosed to prevent the escape of animals.

Areas designated for the keeping of animals should be properly drained to Council's satisfaction.

The noise from animals should not adversely impact upon adjoining residents. It is noted that a certain level of animal noise should be tolerated within a rural area.

The distance between animal accommodation and more intensive human activities (dwellings, public halls, sheds or premises used for the manufacture, preparation, sale or storage of food) should conform to the following minimum standards:

Poultry	16m	Goats	45m
Ducks	30m	Pigs	60m
Horses	16m	Dog kennels	100m

Effluent should be disposed of in a manner that will not impact upon adjoining properties and natural ecosystems or attract vermin and flies.

Note: Further information for the keeping of poultry, ducks, horses, goats, pigs and kennelled dogs is contained within Council's adopted codes.

Animal boarding or training establishments are characterised by the keeping of animals, often in buildings, the need for the importation of feed and the commercial use. Animal boarding or training establishments may include riding schools, veterinary hospitals, cat and dog kennels, and the like.



ANIMAL STOCKING RATES SHOULD BE IN ACCORDANCE
WITH THE LAND CAPABILITY OF THE PROPERTY



KEEPING OF ANIMALS

LAND USE: RURAL INDUSTRIES

Objective

To provide for business activities including the processing of primary products produced in the area or the servicing of agricultural equipment.

Performance Criteria

Rural industries should be located on lots of a sufficient size to accommodate the industry without affecting the amenity of adjoining residents.

Rural industries should not impact upon the environment.

Prescriptive Measures

Rural Industries should not be established on allotments less than 4,000m².

Measures that protect the amenity of surrounding residents should be designed to minimise the impact on the amenity of adjacent properties and include appropriate measures such as landscaping, sound attenuation and buffers.

The following criteria should be considered in selecting a site for a rural industry:

- * sites with less exposure to neighbouring dwellings and noise sensitive areas;
- * sites with good vehicular access;
- * sites which can accommodate landscaping to screen the rural industry;
- * sites with suitable land capability; and
- * sites with sufficient area for expansion.

Rural industry is defined as a business activity involving:

(a) the handling, treating, processing or packing of primary products produced in the locality in which the industry is situated; or
(b) the regular servicing or repairing of plant or equipment used for the purpose of agriculture, aquaculture or for the purpose of a business activity referred to in paragraph (a).

LAND USE: EXTRACTIVE INDUSTRIES

Objectives

To promote the orderly extraction and environmental management of the geological resource.

To protect the natural environment and maintain the amenity of the area.

Performance Criteria

Proposals for extraction should have regard to relevant environmental controls and processes.

Proposals for extraction should be accompanied by an assessment of the likely environmental impacts and plans for subsequent rehabilitation of the land.

Prescriptive Measures

Proposals for extraction in the Rural AE (Large Holdings - Extraction) zone should comply with the Extractive Industries DCP and have regard to the principles of the Maroota Plan of Management for Extractive Industries.

Proposals for extraction in rural zones other than the Rural AE zone, should have regard to the principles of the Extraction Industries DCP and the Maroota Plan of Management for Extractive Industries.

Note: Extractive Industries may require the preparation of a Environmental Impact Statement (refer Appendix A).

LAND USE: TOURISM

Objective

To provide controls to mitigate the potential social and environmental impacts of tourist facilities.

Performance Criteria

Tourist facilities should be compatible with the rural character which attracts visitors to the rural lands.

Tourism should not impact on the amenity of adjacent properties.

Prescriptive Measures

Tourist facilities should not affect the amenity of adjoining properties or the locality in which the dwelling house is situated.

Parking should be provided in accordance with projected needs.

Tourist developments should provide effluent and waste water disposal systems which are compatible with site conditions and have the least environmental impacts. Relevant considerations in determining appropriate systems are provided in the effluent disposal element on page 30.

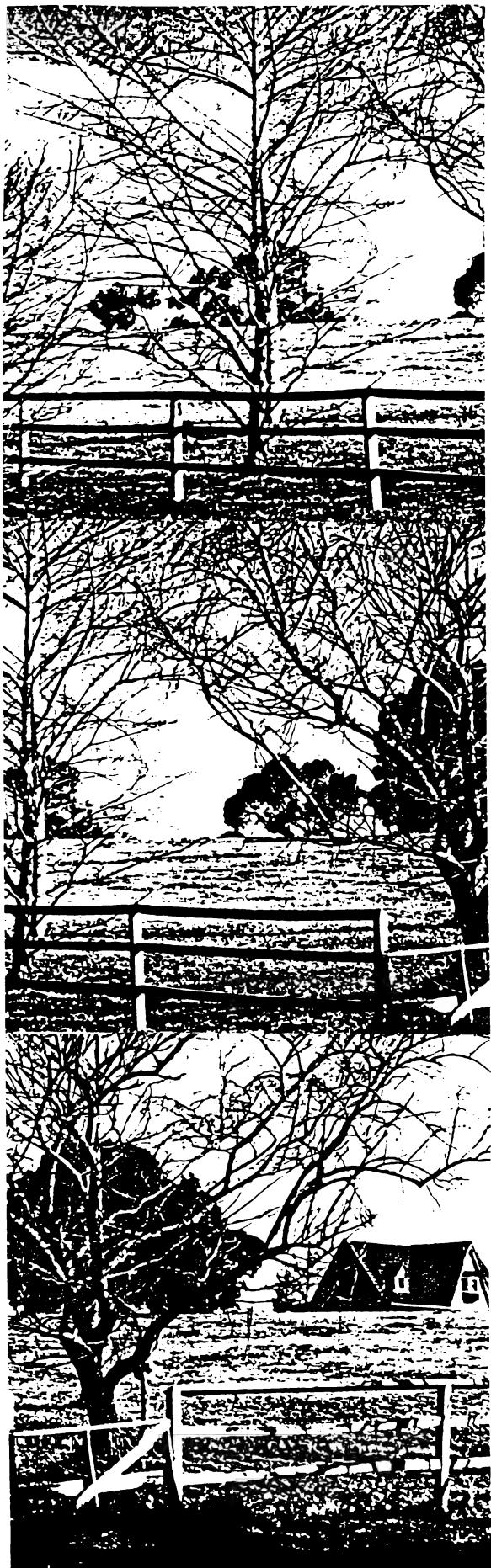
Bed and breakfast accommodation should:

- (a) be undertaken by the permanent residents of the dwelling house;
- (b) be on a short term basis for a maximum of 6 travellers;
- (c) not involve the exhibition of any notice, advertisement or sign (other than a non-illuminated notice or sign which would fit within a rectangular figure of 0.5m²).

Ecotourism facilities should comprise nature based tourism activities or facilities that involve education and interpretation of the natural environment that are managed to be ecologically sustainable. This may include the encouragement of local culture, including aboriginal history, the education of visitors and locals to increase respect for their surroundings, and/or the development of infrastructure to protect and conserve sensitive sites. This may include the additional construction of staff quarters or guesthouse accommodation;

Farmstay accommodation should be owner occupied premises involved with agriculture, aquaculture or an animal establishment, used for the temporary or short term accommodation of a maximum of 6 travellers at any one time and can include the provision of breakfast and planned farm related guest activities.

Guesthouse accommodation should be owner occupied residential premises, used for temporary or short term accommodation and which includes the provision of meals in its tariff.



Part 3 - Elements

ELEMENT: DWELLING DESIGN

Element Objective

To promote housing design that is compatible with the character of the village and rural areas and has regard to the environmental constraints of sites.

Performance Criteria

The design of buildings should complement the built and natural elements of the area.

The design of buildings should relate to the slope of the land to minimise earthworks (cut and fill) and avoid disturbance to the natural landform.

Development should be designed in a manner which is unobtrusive and compatible with the existing character of the area.

Prescriptive Measures

Building Design

Development should be consistent with the dominant design themes within the immediate area, including roof pitch, colours, materials, textures and window placement.

Building design should consist of simple forms and planes. Designs that relate to the rural or residential village nature of the area are encouraged. All roofs should be gabled and the provision of hipped post and wrap-around verandahs, pergolas and court yards are encouraged.

On sloping sites, pole or pier construction, as opposed to concrete slab construction, is favoured for development. This type of construction requires less excavation and disturbance of the land, thereby minimising soil erosion and alteration of runoff characteristics. Consideration should also be given to split level construction.

Design of buildings should conform to the topography to ensure that buildings do not detract from natural ridgelines. Design should be such that buildings utilise the slope of land to their advantage. Roof pitch and design should reflect the slope of land to ensure conformity with the landscape and protection of the scenic quality of the area.

Building and structures in the rural areas should not have an excessively urban appearance.

Dwellings should be constructed consistent with solar design and energy efficiency principles.

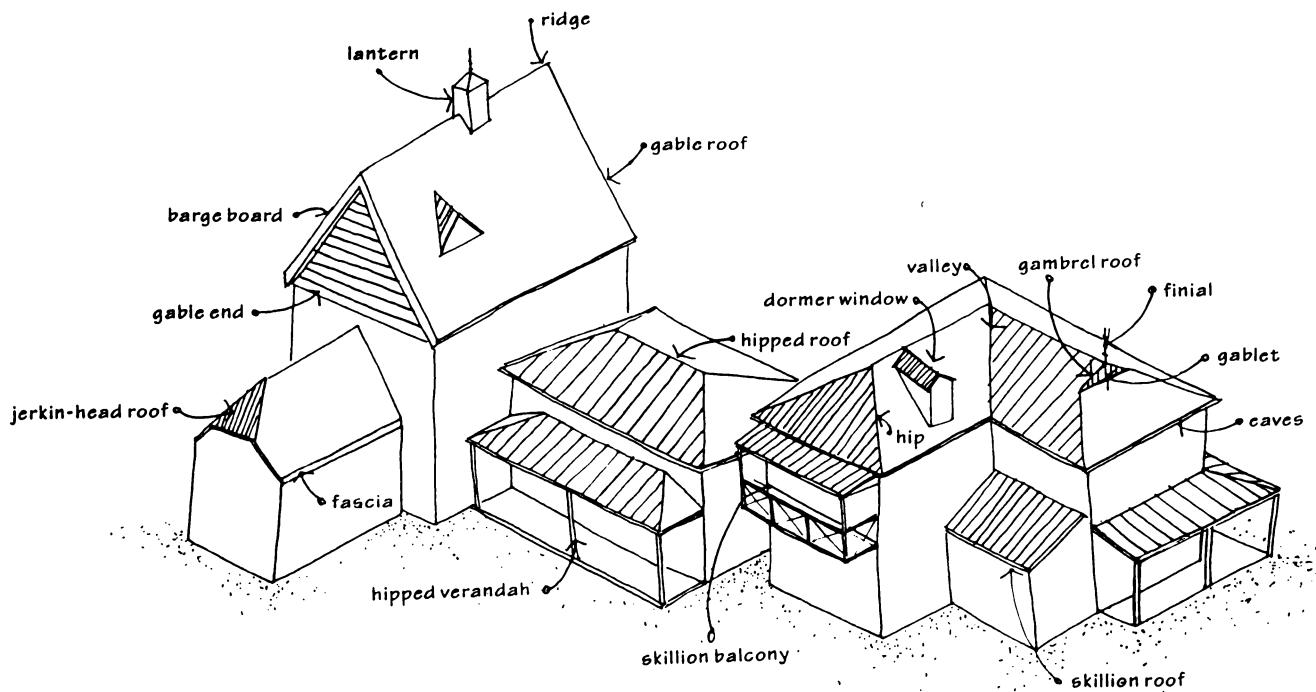
Colours and Materials

Colours should be chosen that are harmonious with the surrounding natural environment. Appendix D to this DCP provides a colour palette of recommended colour schemes.

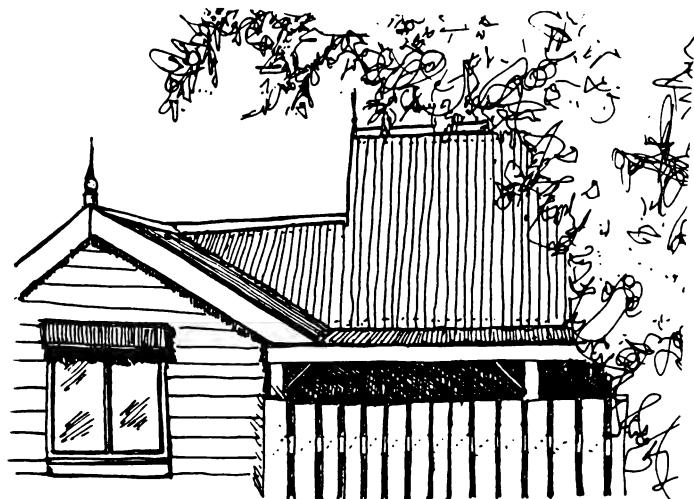
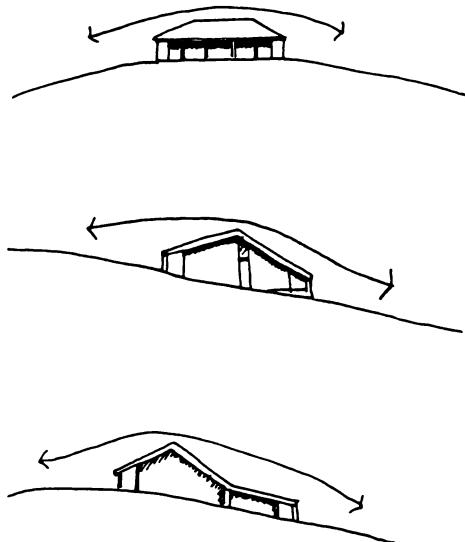
In the residential village areas the use of traditional building materials that contribute to the village character are encouraged, including: stone masonry, brickwork or timber framed construction with tile or slate roofing.

In the rural areas similar materials are encouraged with the inclusion of colourbond roofing.

Building bulk and large areas of brick should be avoided to break up the scale of the building.

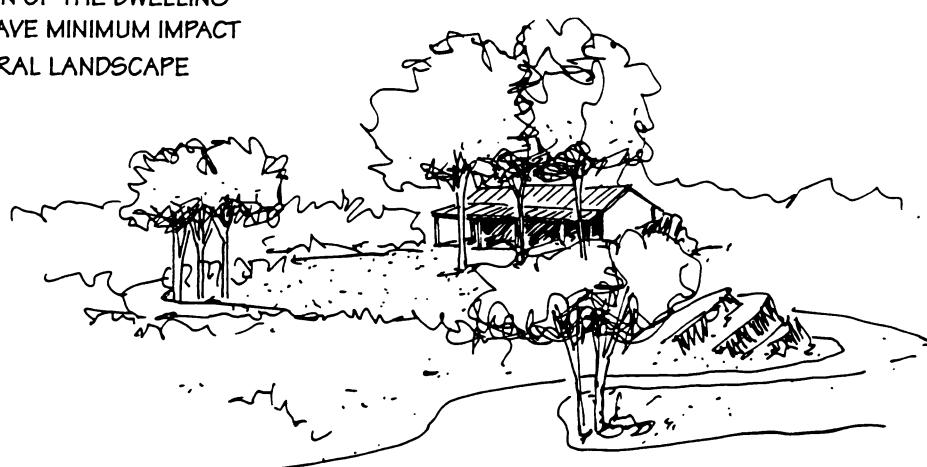


BUILDING PARTS THAT RELATE TO THE RURAL AREA



TRADITIONAL BUILDING MATERIALS
SHOULD BE ENCOURAGED

THE DESIGN OF THE DWELLING
SHOULD HAVE MINIMUM IMPACT
ON THE RURAL LANDSCAPE

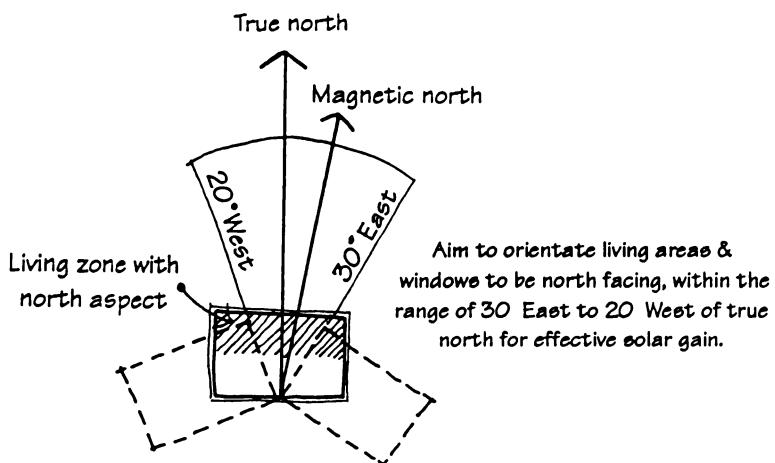


DRIVeways SHOULD BE LOCATED TO RETAIN AS MUCH OF THE PROPERTY'S
VEGETATION & FOLLOW THE NATURAL CONTOUR OF THE LAND.

DESIGN

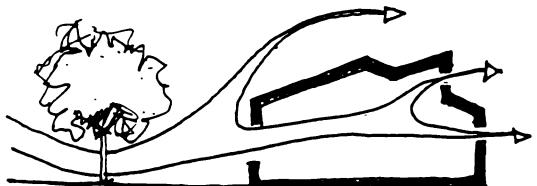
SOLAR DESIGN & ENERGY EFFICIENCY

ORIENTATION & DESIGN OF THE DWELLING
SHOULD OPTIMISE SOLAR PENETRATION



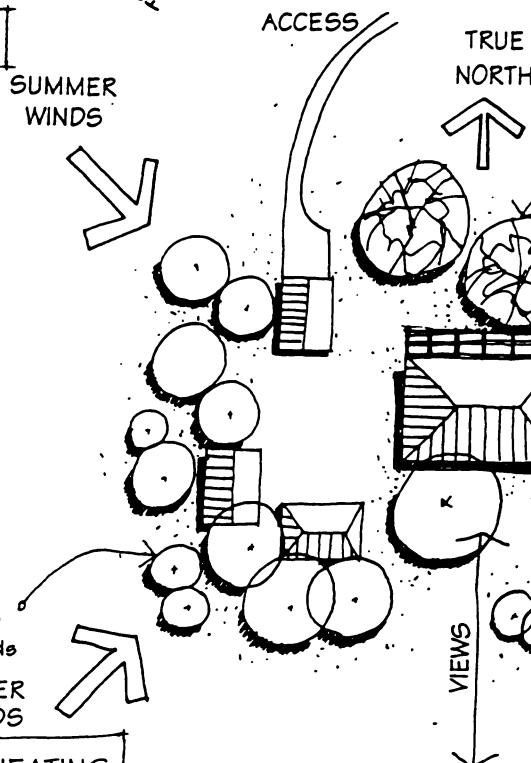
VENTILATION

Orientate dwellings to benefit from cooling easterly/north easterly summer breeze.



To assist ventilation, locate windows & openings in line with each other & with the prevailing breezes.

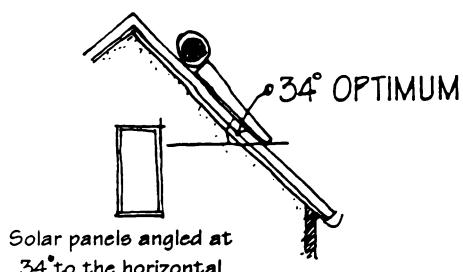
SITE PLANNING



The wide canopies of deciduous trees on the northern side, can provide shade from high summer sun and yet allow winter sun to penetrate

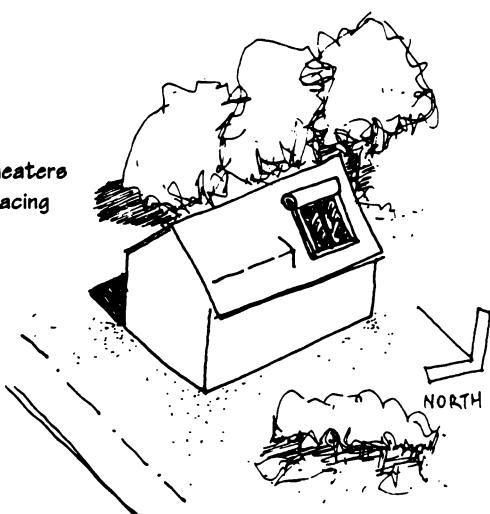
Reduce summer sun penetration by the use of external solar shading devices such as; awnings, external venetians, balconies, pergolas, eaves, overhangs, etc.

SOLAR WATER HEATING



To function efficiently, solar water heaters should be located on a northerly facing roof or suitable location.

Locate the solar water heater back from the street frontage

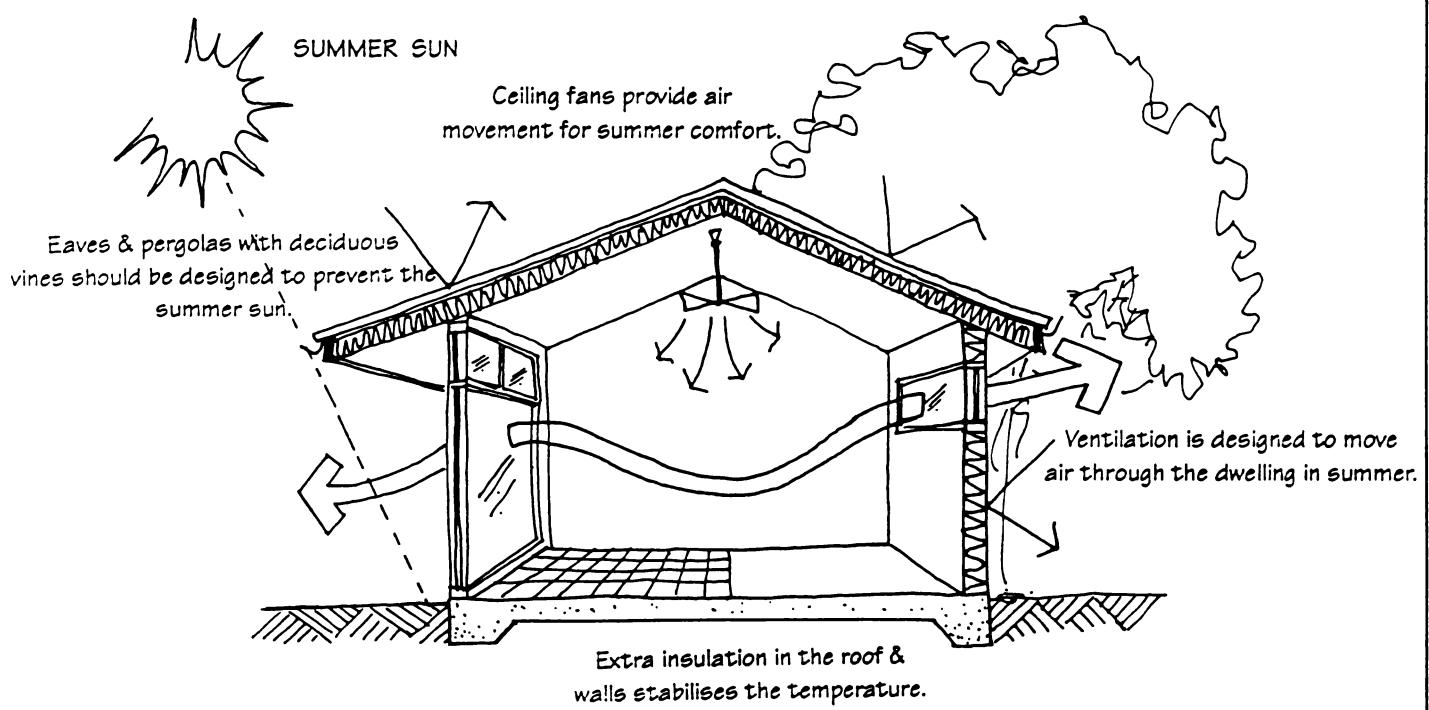
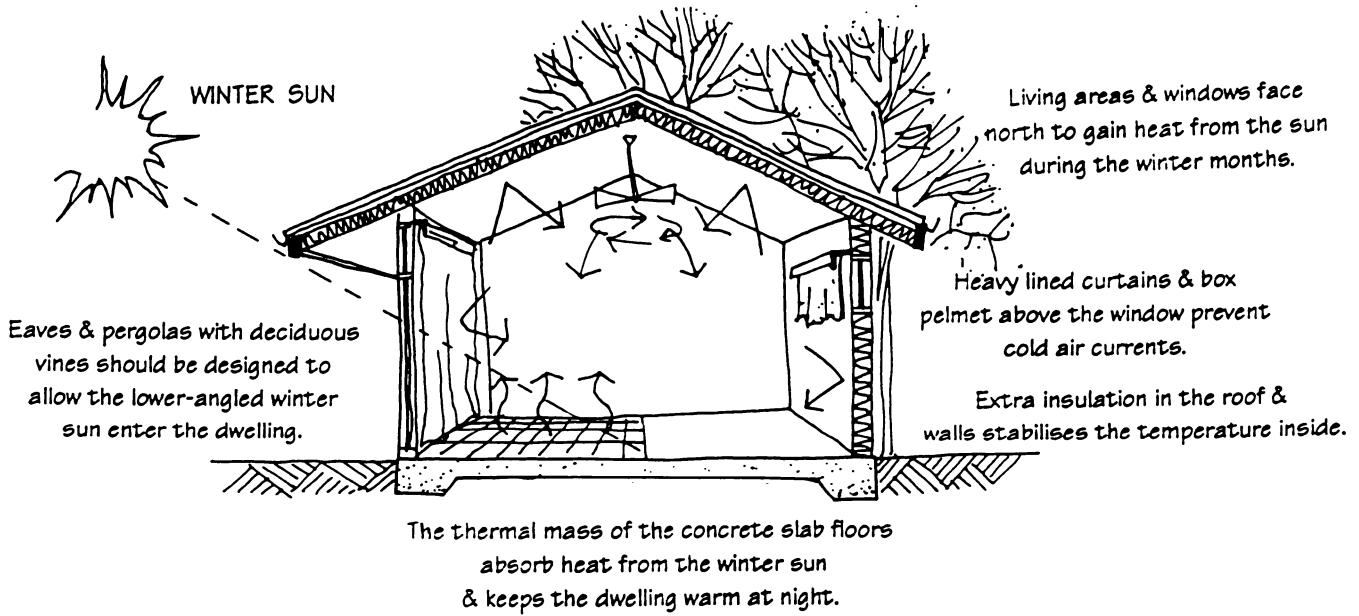


Solar collectors should not be shaded from buildings or trees for most of the day.

Solar water heating has many advantages over conventional electric & gas water heaters;

- * Savings in hot water costs (typically 60-75%);
- * Savings in energy consumption; &
- * A reliable system, that can last longer than conventional systems.

DESIGN



ELEMENT: SETBACKS

Element Objective

To provide setbacks that complement the rural and village character, provide for landscaping and protect the privacy of adjacent dwellings.

Performance Criteria

Setbacks in the rural area should complement the rural character and allow for landscaping and open space between dwellings and other structures.

Setbacks in the village areas should complement the village character and allow for landscaping and open space between dwellings and other structures.

Setbacks should improve the amenity of dwellings adjacent to major roads and provide for possible road widening, landscaping and acoustic measures where necessary.

Prescriptive Measures

Village Areas

A minimum setback of 6m should be maintained from the primary front boundary.

Side setbacks for dwellings should generally be a minimum of 1m however, zero boundary setbacks will be considered having regard to the above performance criteria and the Building Code of Australia.

Rear setbacks for dwellings should be a minimum of 3m.

Where dwellings are proposed on corner allotments, the setbacks from the secondary street frontage should provide a transition between the proposed and adjoining dwellings and should be a minimum of 3m.

Rural Areas

A minimum setback of 30m should apply to buildings and other structures fronting arterial roads, namely Hastings Road, Old Northern Road, Mid-Dural Road, Galston Road, Arcadia Road, (from Galston Road to Bayfield Road and Blacks Road to Bay Road), Bayfield Road, Blacks Road (from Bayfield Road to Arcadia Road) and Bay Road.

A minimum setback of 15m should be maintained for buildings and other structures from all property boundaries. Small lots, unable to meet these setbacks, should provide as great a setback as possible and practical from all boundaries.

Buildings and structures visible from public roads in the rural areas should avoid urban appearance and elements.

Foreshore building line

A foreshore building line of 30m should be maintained for development adjacent to Hawkesbury River, between Wisemans Ferry and Gentlemans Halt.

Development is prohibited between the foreshore building line and mean high water mark, except development for the purpose of:

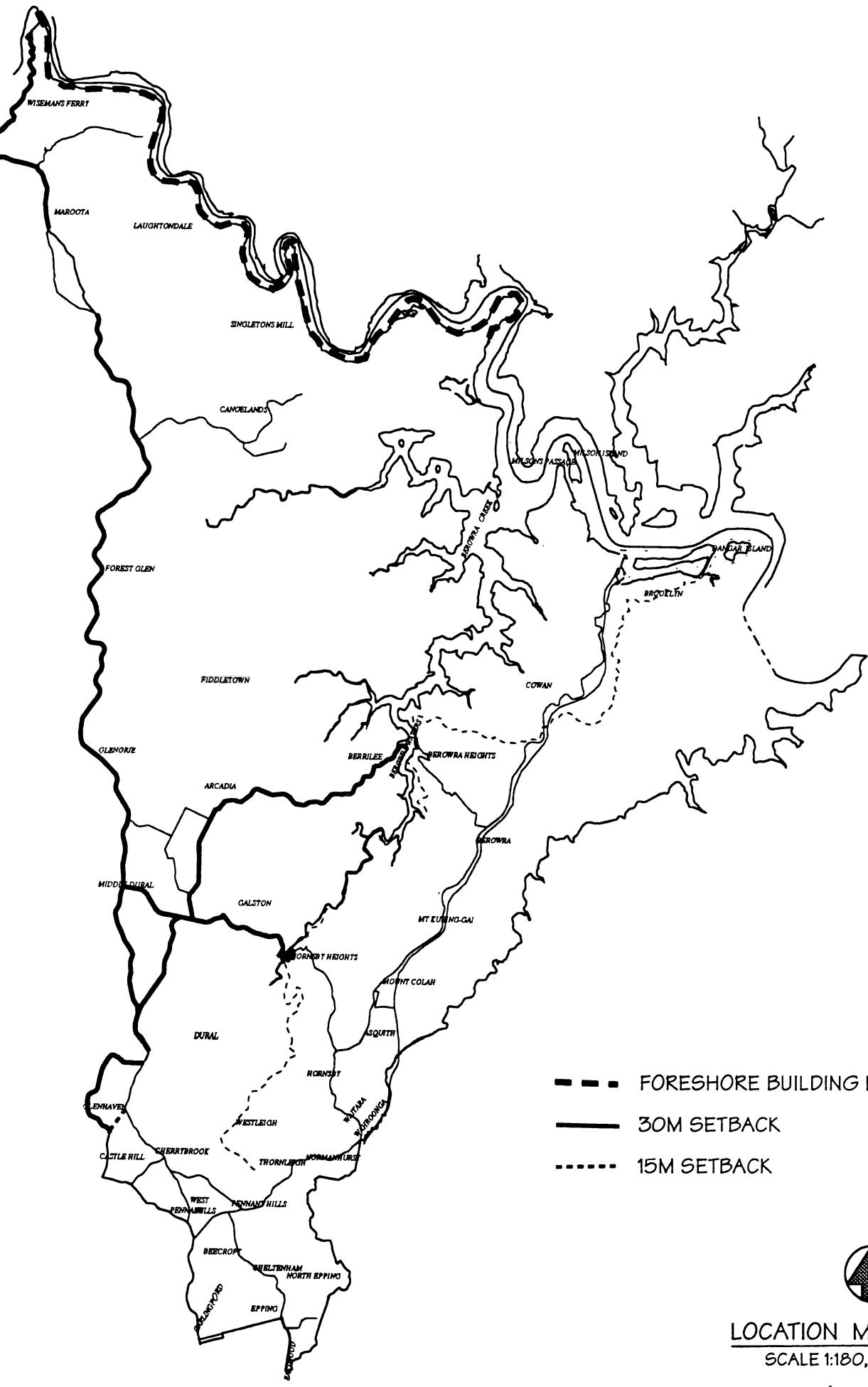
- (a) a wharf, jetty or pontoon;
- (b) a slipway;
- (c) a single storey boatshed not exceeding 30m² in area;
- (d) works to enable pedestrian access (clause 20, HSLEP).

Flood line

Flood prone land is located along the Hawkesbury River, downstream of Wisemans Ferry, between the mean high water mark and the floodline. Development consent is required for all development in flood prone land. The floor of any habitable building situated on flood prone land should not be less than 6m above standard datum.

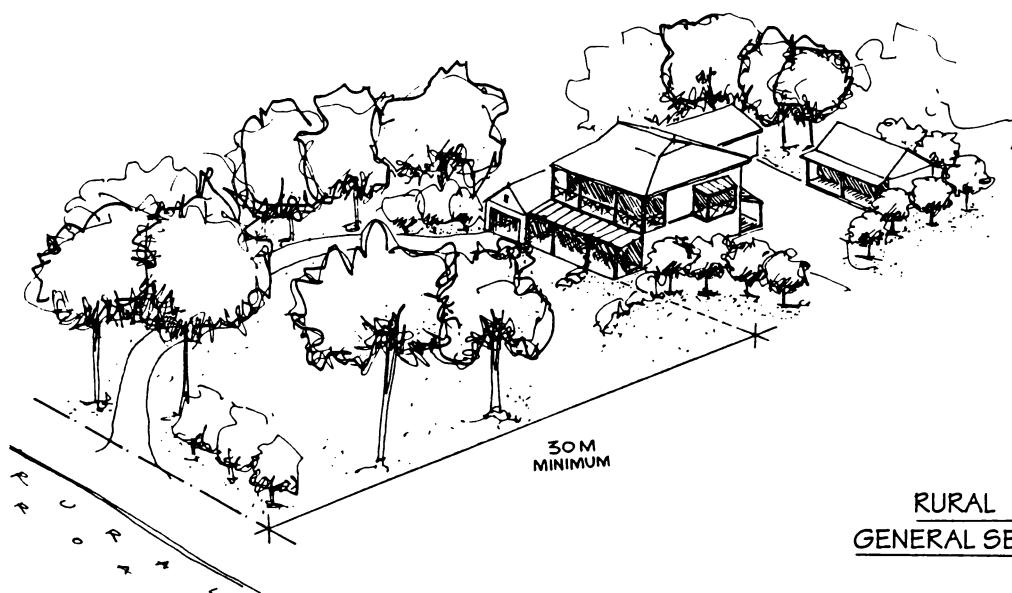
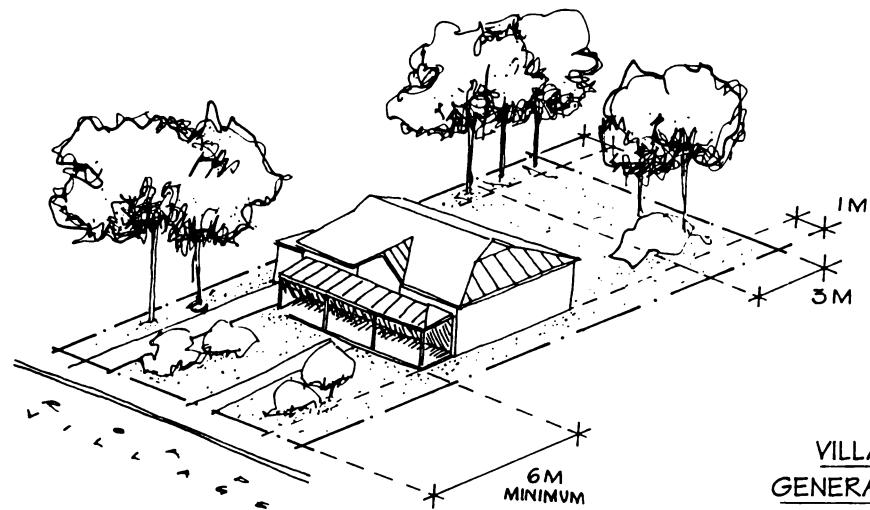
Note

- i) Land subject to the floodline is shown on Map 1 of the Hornsby Shire Local Environmental Plan, 1994.
- ii) Standard datum is 50mm below Australian Height Datum.



LOCATION MAP
SCALE 1:180,000

SETBACKS



SETBACKS

ELEMENT: SOIL AND WATER MANAGEMENT

Element Objectives

To minimise soil erosion and sedimentation by minimising land disturbance and requiring control measures at the source.

To ensure the potential impacts of development on the water quality of the Hawkesbury River and its tributaries can be quantified and evaluated in the context of Ecologically Sustainable Development.

Performance Criteria

Best management practices should be implemented to control runoff and soil erosion and to trap sediment to ensure no nett impact on downstream water quality.

Polluted water should be collected and treated on site.

Development should be designed to minimise disturbance of lands with topographical constraints.

Prescriptive Measures

Soil and Water Management Plan

All development proposals should be accompanied by a Soil Water Management Plan (SWMP) (written document and site diagrams) prepared by a suitably qualified person. The Plan should detail soil conservation and pollution control measures to be installed prior to clearing and earthworks and maintained until landscaping measures are complete.

Council should be notified 48 hours prior to the commencement of site works to arrange inspection of control measures.

Soil and water management measures should be designed for the 1 in 5 year storm event.

Water Quality Safeguards

The SWMP should detail means to achieve no net increase in pollution of downstream waters through the use of Best Management Practices.

This assessment should include the means to collect and treat polluted and nutrient rich runoff on site to minimise filtration of pollution into the soil and groundwater.

Methods should include channelling runoff to dams or ponds designed to function as artificial wetlands with plant species which can absorb nutrients.

The Plan should balance the management of runoff between farm dam storage and the needs of the downstream environment.

Where any proposal will have an adverse impact on water quality or the potential impact cannot be scientifically quantified or resolved, the proposal should not proceed.

Development involving the clearing, draining or excavating of land should not be undertaken in areas identified with acid sulphate soils or potential acid sulphate soils.

Soil Conservation Measures

Development of slopes greater than 20% should be avoided. Lands with slopes greater than 20% and having soil landscapes with a moderate to high soil erosion hazard are considered as sensitive areas. Development should minimise disturbance to these areas by minimising areas of cut and fill to depths of 1m. Development proposals within these areas should be accompanied by:

- an evaluation of the site stability (ie. a geotechnical report);
- a schedule of earthworks; and
- details of appropriate construction techniques.

Agriculturally Productive Land

All development proposals on potentially agricultural land should be accompanied by an assessment of the agricultural capability of soils on the property and the effect of the development on the agricultural capability of these soils.

Contaminated Land

Soil Contamination Assessment should accompany all subdivision applications on properties where there is a likelihood of contamination due to past agricultural or industrial activities to determine if there is any contamination. Where soil contamination is found, the assessment should detail the extent and levels of contamination and remediation measures.

Note: Initially proponents should consult Council's register of contaminated sites.

For further information please consult Council's:

- * *Draft "Soil and water management policy and code of practice" (1994)*
- * *Draft urban runoff management code*
- * *Draft urban drainage design manual*
- * *Issues report on remediation of Council's stormwater system*
- * *Draft water quality management strategy*
- * *Draft public education strategy*

ELEMENT: DRAINAGE CONTROL

Element Objective

To retard the flow of water, above natural volumes, into the natural drainage system and mitigate impacts from stormwater runoff.

Performance Criteria

Drainage from development sites should be consistent with the pre-development stormwater patterns.

Drainage systems should be designed to ensure safety and minimise stormwater inundation of habitable floor areas.

Prescriptive Measures

The stormwater discharge for development sites should not exceed the 5 year ARI storm event.

Unpolluted stormwater should be gravity drained to Council's drainage system (where available), which may require inter-allotment drainage.

On-site stormwater and drainage control should be designed for the 20 year ARI storm. Trunk drainage systems should provide for the 20 year ARI event with overland flow paths designed for the 100 year storm ARI event.

Proponents may require the creation of easements over downstream properties for drainage purposes. In this circumstance, a letter of consent from the owner(s) of the downstream properties is to be submitted with the development application.

The habitable floor areas of dwellings constructed adjacent the trunk drainage systems, watercourses and creeks should be a minimum of 0.5m above the 100 year ARI flow level.

Energy dissipators should be used to reduce the velocity of stormwater into watercourses, foreshore areas and tidal zones.

The discharge of water to adjoining lands should reflect the pre-existing or natural situation. Concentrated flows, of unpolluted water, should be channelled to natural drainage systems or absorbed into the groundwater, in an appropriate manner.

Note: ARI - Average Recurrence Interval (i.e. 1 in X years average storm event).

The following documents have recently been prepared and may be of assistance:

- * *Draft soil and water management code*
- * *Draft urban runoff management code*
- * *Draft urban drainage design manual*
- * *Issues report on remediation of Council's stormwater system.*
- * *Draft water quality management study*
- * *Draft public education strategy*

ELEMENT: EFFLUENT DISPOSAL

Element Objective

To ensure that effluent and household waste water is disposed of in an environmentally acceptable manner that will not cause a reduction in water quality, or unhealthy or unsanitary conditions.

Performance Measures

Effluent and household waste water should be disposed of in a manner consistent with the land capability of the property.

Effluent and household waste water should be disposed of in a manner that will not cause unhealthy or unsanitary conditions.

Prescriptive Measures

Effluent and household waste water from the village areas should be disposed of by tanker pump-out service. Each residence should have a holding tank with a 2,400L capacity and a collection tank of 4,600L capacity.

For rural allotments on-site disposal can be achieved through a septic tank and absorption trenches, domestic sewerage treatment plant (DSTP), composting or chemical toilets, or a combination of the above.

The method of on-site disposal should be consistent with the site characteristics. Relevant matters for consideration are:

- soil type and depth;
- proximity to watercourses or tidal waters;
- depth of water table;
- slope of land;
- vegetation
- area of land available for the spraying of treated effluent from a DSTP.

Disposal of effluent must not create a health nuisance or pollution particularly in relation to nutrients infiltrating into bushland and waterways.

Proponents are required to demonstrate that any proposed effluent or waste water system will not have an impact on downstream water quality and provide a soil survey detailing the soil type and its absorption capacity.

Note: For further information, please consult Council's policies on:

- * *Septic tanks;*
- * *Domestic Sewerage Treatment Plant installations*
- * *Sullage collection;*
- * *Composting toilets.*

The current minimum area of 200m² for effluent disposal through absorption and infiltration systems is under review due to limited soil life for nutrient absorption. Areas of 350m² have been identified as being necessary for some portions of the rural lands.

ELEMENT: FLORA AND FAUNA PROTECTION

Element Objective

To protect bushland, significant flora and fauna habitats and wildlife corridors from the impacts of development.

Performance Criteria

Significant flora and fauna habitats should be preserved.

Vegetative links between bushland areas should be maintained to provide for the movement of fauna species and maintain biological diversity.

Development should be designed to minimise disturbance to existing vegetation, ground surface and drainage, particularly on sites with topographical constraints.

Vegetation which adds significantly to the visual amenity of the area or the stability of the land should be retained.

The perimeter of urban development adjoining bushland should be minimised. Development should be designed so as to not fragment surrounding bushland.

Prescriptive Measures

Vegetation and fauna assessments prepared by suitably qualified persons should accompany all development proposals, which involve the clearing, removal or alteration of bushland or are adjacent to National Parks, Nature Reserves, Bushland Parks, public open space (except playing fields or other open space areas) or other bushland areas. This requirement is in addition to other flora and fauna documentation prescribed below and should include a list of communities and species present with an emphasis on the existence of rare or endangered species.

The provisions of the National Parks and Wildlife Act apply where protected and endangered fauna are identified.

State Environmental Planning Policy No. 19 - Bushland in Urban Areas

Development within or adjoining land zoned or reserved for public open space should address means to protect and minimise bushland disturbance in accordance with SEPP No. 19.

State Environmental Planning Policy No. 44 - Koala Habitat

For development proposals on sites greater than 1 hectare the vegetation and fauna survey should include an assessment of potential and core koala habitat, as applicable. For sites identified as potential koala habitat, a Fauna Impact Statement should be undertaken. For core habitat areas a Plan of Management should be undertaken.

Bushland Conservation Areas

Development proposals within or adjoining lands identified as Bushland Conservation Areas should be accompanied by a preliminary Fauna Impact Assessment.

The specific objectives for core bushland are:

- (a) to preserve core bushland areas and to minimise their development, fragmentation and disturbance;
- (b) to allow only those uses that are compatible with the preservation of bushland;
- (c) to maintain natural biological processes and the diversity of species of fauna and flora, as far as possible; and
- (d) to minimise as far as possible the introduction (whether intentional or otherwise) of non-indigenous flora and fauna;

Development should not unduly affect bushland nor introduce non-indigenous plants or animals.

Development proposals should illustrate the means to protect the vegetation from disturbance.

To prevent encroachment on adjoining land, subdivision layout should take into account the need for future land management activities such as bushfire control, weed control, land stability and the maintenance of soil and water management measures.

A buffer area of 30m should be provided from the boundary of wetland or saltmarsh plant communities.

Bushland Corridors

In addition to measures listed under Bushland Conservation areas, development proposals within identified bushland corridors should minimise the extent of land clearing.

The specific objectives for bushland corridors are:

- (a) to provide effective links between core bushland areas;
- (b) to limit the density of development so as to allow fauna to move between core bushland areas;
- (c) to preserve links between core bushland, to allow exchange of plant genetic material; and
- (d) to rehabilitate corridor areas to maintain fauna habitat;

Other Significant Bushland

The specific objectives for other significant bushland are:

- (a) to ensure clearing or other development takes into account the general objectives of this plan, and that measures are taken to implement the objectives;
- (b) to provide a protective buffer to preserve core bushland areas; and
- (c) to protect regionally significant vegetation communities within remnant bushland outside reserves.

Adjoining Land

Development adjoining identified Bushland Conservation Areas should contain a 10 metre appropriately managed buffer. On-site soil and water management works and on-site fuel reduction zones to minimise bushfire hazards should be incorporated into this area.

The specific objectives for adjoining land are:

- (a) to ensure clearing or other development takes into account the general objectives of this plan, and that measures are taken to implement the objectives;
- (b) to provide a protective buffer to preserve core bushland areas;
- (c) to protect regionally significant vegetation communities within remnant bushland outside reserves;
- (d) to maintain natural biological processes as far as possible;
- (e) to minimise as far as possible the introduction (whether intentional or otherwise) of non-indigenous flora and fauna into Bushland Conservation Areas.

There should be no land filling or earthworks within 10 metres of adjoining bushland.

The provisions of the "Development Code for Land Adjoining Bushland zoned or Reserved Public Open Space" also apply where land adjoins bushland zoned or reserved public open space.

Plans of Management

Council may approve a Plan of Management for any act that is carried out in the ordinary course of occupation, use or management of land prescribed as a bushland conservation area/corridor.

Where a Plan of Management has been certified, development consent to undertake those acts is not required.

Fauna Habitat

Fauna Habitat Links are provided between core bushland areas and allow for the movement of fauna by retaining fauna habitat (including tree and shrub cover) through limiting the density of development.

Proposals within Bushland Conservation Corridors should be accompanied by an evaluation of:

- a) the presence of rare or threatened plants or endangered fauna;
- b) the significance or vegetation communities on the land;
- c) the significance of fauna habitat on the land;
- d) measures to be taken to ameliorate any impacts on bushland;
- e) the purpose and significance of any corridor and the effect of the development on those species likely to utilise the corridor;

Note: Bushland Conservation Areas include Core Bushland, Other Significant Bushland and bushland corridor. Appendix C to this DCP identifies Bushland Conservation Areas.



PRESERVATION OF REMNANT
ROADSIDE VEGETATION

FLORA & FAUNA PROTECTION

ELEMENT: VISUAL AMENITY

Element Objectives

To preserve important views and vistas.

To preserve and enhance significant visual landscapes in the rural lands.

Performance Criteria

Development should be designed to have minimum impact on significant views and vistas.

Development should be compatible with the cultural and landscape characteristics of the relevant visual character type.

Prescriptive Measures

Development involving new buildings should have regard to the siting and landscape design issues to promote consistency with the relevant landscape character type.

There are nine landscape character types within the rural lands, as follows:

- Type 1 - Mixed Intensive Agriculture
- Type 2 - Mixed Agriculture and Rural Residential
- Type 3 - Orchards and Poultry Farming
- Type 4 - Intensive Orchard Landscapes
- Type 5 - Active Conversion of Orchard and Poultry Farms to Hobby Farms
- Type 6 - Rural Residential Marginal Land
- Type 7 - Alluvial Agricultural Lands
- Type 8 - Alluvial Wetlands
- Type 9 - Creek Flood Plains

Maps identifying landscape character types throughout the rural lands are provided in Appendix E.

Development proposals should be accompanied by an assessment of the effect of the proposal upon the visual amenity and quality of the site and surrounding area. Having regard to the following character types and principles.

An inventory of siting and landscape design issues in relation to landscape character types are provided in accordance with the principles below.

PRINCIPLES	CHARACTER TYPE
Rural treatment of frontage/streetscape rather than excessively urban features such as formal gates and high fences and use screen planting which preserves sight lines.	1, 2, 5, 6, 7
Impervious surfaces should be kept to an absolute minimum.	1, 2, 4, 6
Minimal clearing of vegetation for conversion to grassy and manicured surfaces.	1, 2, 3, 5, 6
Retention of natural road verges and preservation of remnant natural vegetation found there.	1 to 7
Building sizes, styles and forms which relate to the rural environment and local precedents.	1 to 7
Use of plant species that have traditionally been used in landscape schemes.	1, 2, 5
Prominent buildings located in highly visible locations or which interrupt sensitive sight lines.	1 to 7
Siting of residences to take advantage of site conditions.	1, 2, 5
Siting of residences to reduce visibility from road or to retain view lines from the river.	6, 7

ELEMENT: LANDSCAPING

Element Objectives

To provide attractive landscapes which are consistent with the visual landscapes in the rural lands.

To promote the growth of native species in order to minimise the need for insecticide and pesticide for introduced and exotic species.

Performance Criteria

Landscaping should complement the visual character of the different landscape types in the rural lands.

Landscaping should be compatible with the natural features and climate of the area and consist of native species.

Prescriptive Measures

Landscaping in rural areas should avoid large scale clearing of vegetation for conversion to grassy and manicured surfaces.

Appendix F provides a list of suitable plants that can tolerate the shale and sandstone soil types and dry conditions in the rural lands.

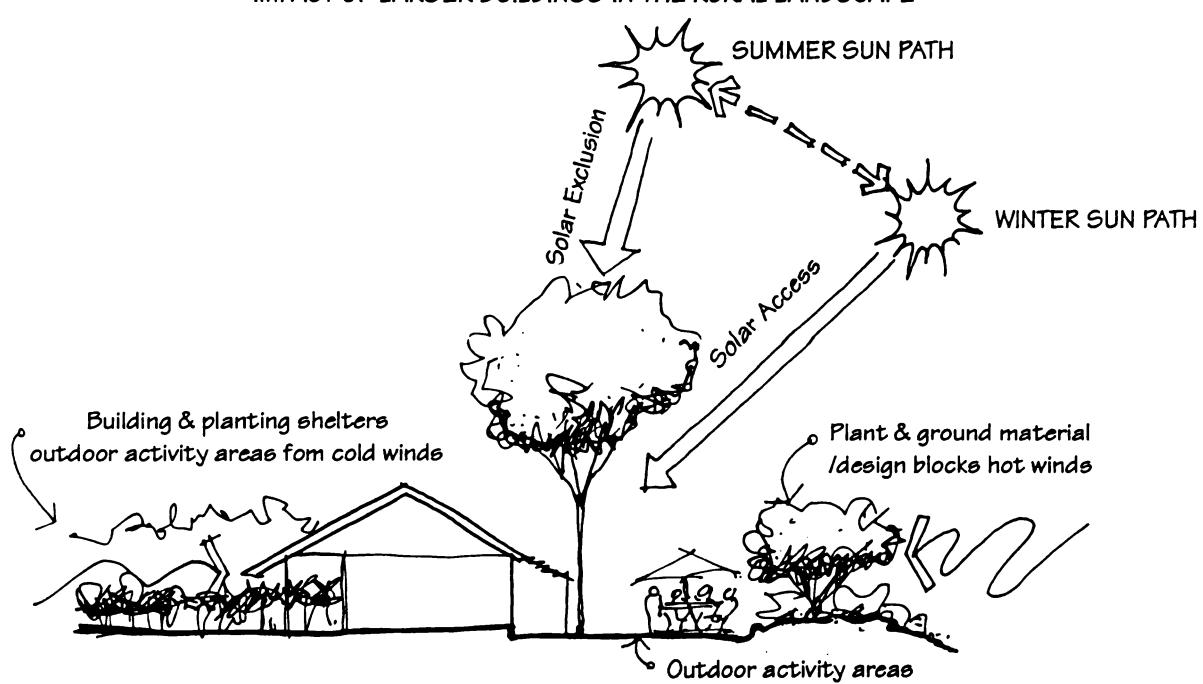
Significant trees should be retained and incorporated into the landscaping.

The provision of screen planting should preserve sight lines in rural areas with recognised visual significance.

Tree planting should be limited to indigenous species that are endemic to the area.



TALLER TREES PROVIDE SHELTER & SHADE
YET ALLOW VIEWS TO BE MAINTAINED



LANDSCAPE & SITE PLANNING

LANDSCAPING

ELEMENT: FENCES AND GATES

Element Objective

To provide fencing which is compatible with the visual significance of the rural lands and complements the overall character of the area.

Performance Criteria

In the residential village areas where fences are a characteristic of the street, new fences should be designed to complement the streetscape, design and age of the building.

In the rural areas, fences should be compatible with the open character of the area.

Prescriptive Measures

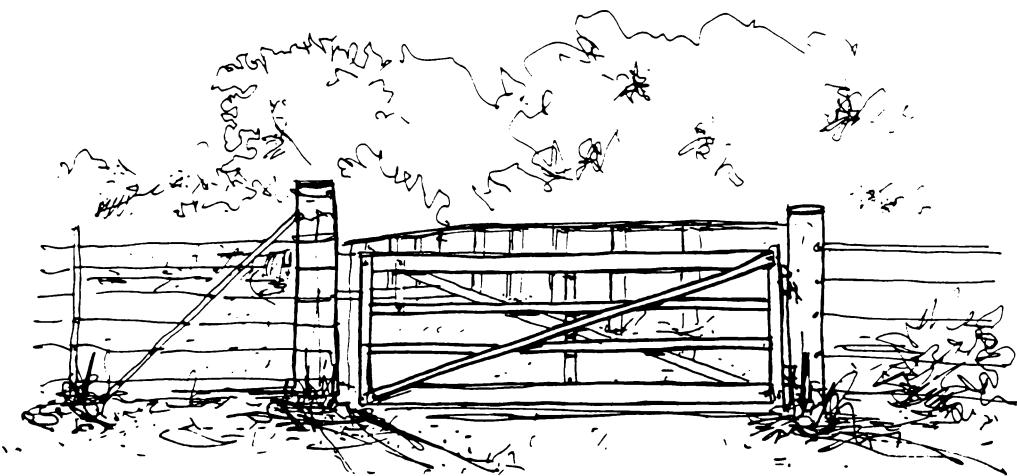
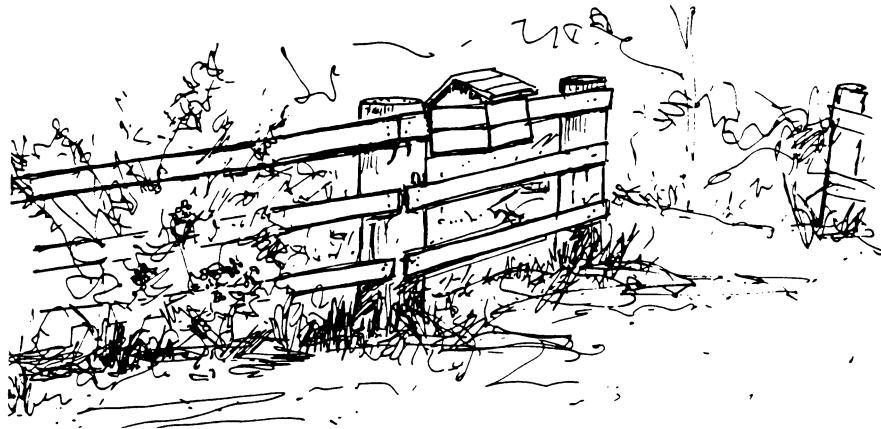
Where the street has few or no fences, solid fencing should be avoided to maintain the open streetscape appearance and character of the area.

Appropriate fencing materials include light weight materials such as timber and wire mesh. Sheet metal or tubular steel fences should be avoided in both rural and village areas.

In the village areas where fences predominate in the street, new fences should reflect the style, height and materials of surrounding fences.

High, solid fences constructed as sound barriers should be avoided. On main roads alternative measures of reducing traffic noise should be explored, such as double glazing, internal layout, earth mounds and vegetation.

Regard should be given to the height, materials, design and colour of new fences in relation to the character of the dwelling and/or the theme of the area.



FENCES & GATES SHOULD BE CONSTRUCTED OF
LIGHT WEIGHT MATERIAL THAT IS CHARACTERISTIC WITH
THE OPEN CHARACTER OF THE AREA



FENCES & GATES

ELEMENT: HERITAGE

Element Objectives

To provide for continuity with the past through the retention of heritage items.

To ensure that development involving heritage items is compatible with the significance of heritage items, their setting and the amenity of the rural area.

Performance Criteria

Heritage items should be retained where possible.

Development should be sympathetically designed and sited to ensure that the existing heritage value of the item is maintained and any impact is minimised.

Adaptive reuse of heritage items will be considered where the conservation of the building depends on this action.

The rural character of the area should not be adversely affected by the adaptive reuse of heritage buildings.

Prescriptive Measures

Development proposals involving heritage items should be accompanied by a heritage impact assessment which outlines the impact, if any, the proposal will have on the item and its setting. Guidelines for the preparation of a Heritage Impact Assessment are contained in the Draft Heritage DCP.

Development proposals in the vicinity of heritage items should demonstrate how the proposal will integrate with the item and its setting as part of the Statement of Environmental Effects.

Proponents may be required to submit a photomontage or artist's impression illustrating the relationship between the proposed development and the existing heritage item.

Development consent from Council is required before any development can occur on a property containing a heritage item. The following works generally do not require development consent providing the heritage significance of the item or area will not be adversely affected.

- * erection of detached carports and garages;
- * repainting surfaces that are already painted;
- * maintenance or repair work;
- * internal alterations;
- * installation of skylights, solar panels, roof vents, water heaters or communication facilities;
- * erection of minor outbuildings, structures and swimming pools;
- * demolition or erection of rear or side fences or walls;
- * any works which remove additions and alterations and return the building or work as closely as possible to its original appearance.
- * other minor works of a like or similar nature.

A building consent, however, would normally be required.

Adaptive Reuse of Heritage Items

New development should be consistent with the predominant rural character of the heritage items, having regard to the design, materials, roof pitch, colours, textures, siting and landscaping.

Development proposals involving the adaptive reuse of heritage items should demonstrate in the Heritage Impact Assessment:

- * how the proposal will complement the heritage significance of the building and its setting and the amenity of the area;
- * the traffic and car parking conditions of the site or area;
- * the compatibility of the proposal and the rural character of the area; and
- * how the conservation of the building depends on the granting of such consent.

Advertising signs on heritage buildings should be kept to a minimum and be located below the verandah or eaves of the building. Internally illuminated and projecting signs should be avoided.

Erection of a Second Dwelling on Heritage Sites

Development proposals involving the erection of a second dwelling on the site of a heritage item should demonstrate in the Heritage Impact Assessment:

- * how the heritage significance of the item or area will be affected by the proposal; and
- * how the conservation of the building depends on the granting of such consent.

Note: (i) The creation of separate titles, torrens, strata or community is not permitted where second dwellings are proposed on allotments containing heritage items.

(ii) Council's Heritage Planner should be contacted to clarify whether development consent is required.

(iii) For further information on heritage items and issues please consult Council's Heritage DCP and inventory sheets (Appendix G to this DCP contains a list of Heritage Items in the study area).



HERITAGE ITEMS SHOULD BE RETAINED TO
PROVIDE FOR CONTINUITY WITH THE PAST



HERITAGE

ELEMENT: FIRE HAZARD

Element Objective

To minimise the risk to life and/or property from bush fires.

Performance Criteria

Development should provide for separation between dwellings and potential bush fire fronts.

Properties prone to bushfires should incorporate a means to mitigate the risk.

Prescriptive Measures

The following may be required for development of rural lands which adjoin bushland:

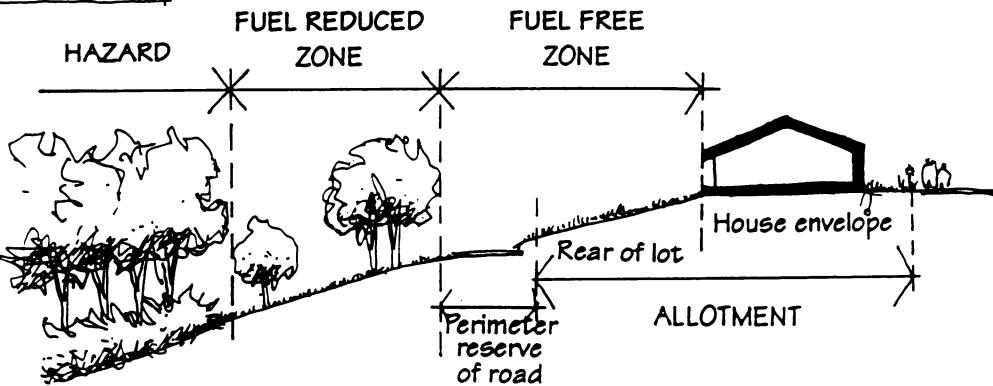
- * a appropriately located fuel reduced zone and/or fuel free zone managed for hazard reduction;
- * uninhibited access for fire fighting equipment including details of gradients and manoeuvring areas;
- * a water tank with 10,000L of water capacity dedicated for fire fighting purposes with a 38mm storz outlet with gate valve, and enough cleared space to located a portable pump;

- * use of brick construction wire mesh on doors and windows, sealing under floor areas, roofs with no valleys to trap debris, boxed in eaves, enclosed foundations and non combustible materials in dwelling construction; and
- * dwellings should be appropriately located to minimise the potential impact of bushfires.

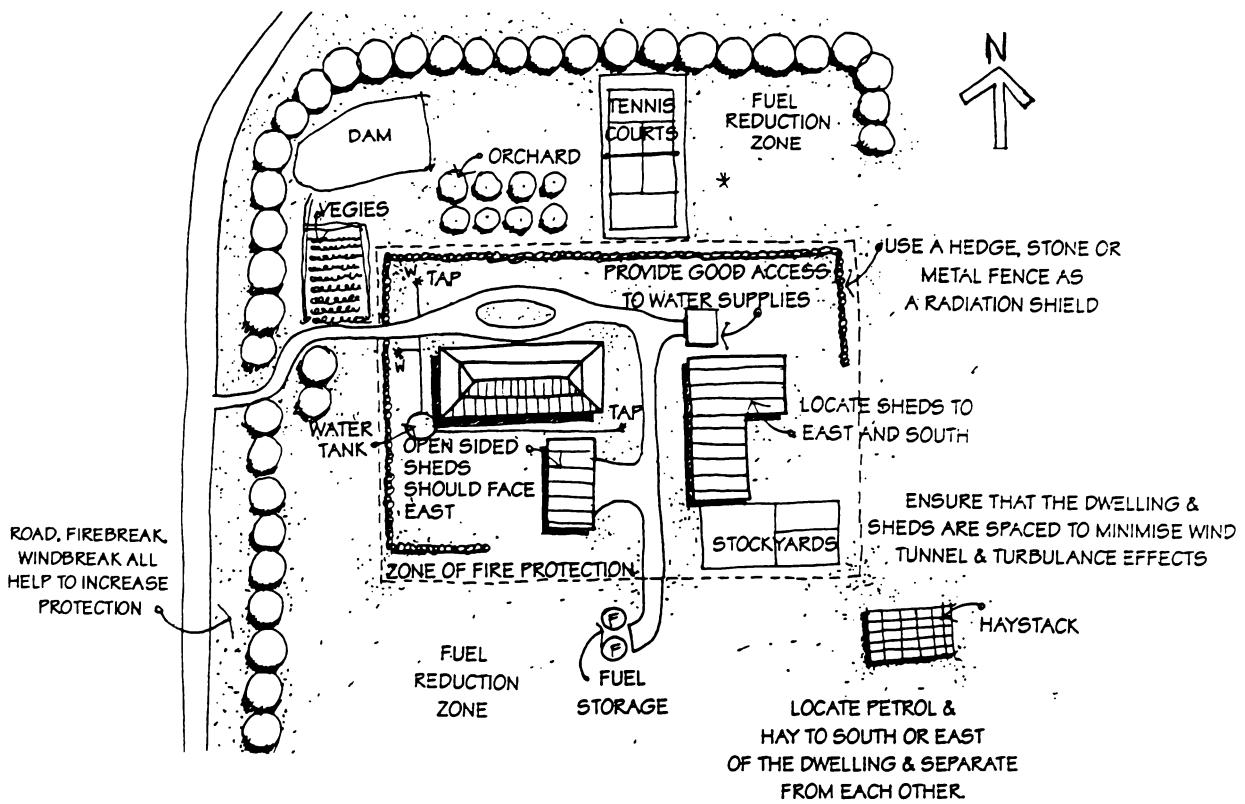
Note:

- (i) *It will be necessary to consult with Council to determine the type of measures for bushfire protection.*
- (ii) *Proponents should have regard to the CSIRO's publication Building in Bush Fire Prone Areas (1993) and Australian Standard AS 3959-1991- Construction of Buildings in Bush Fire Prone Areas.*

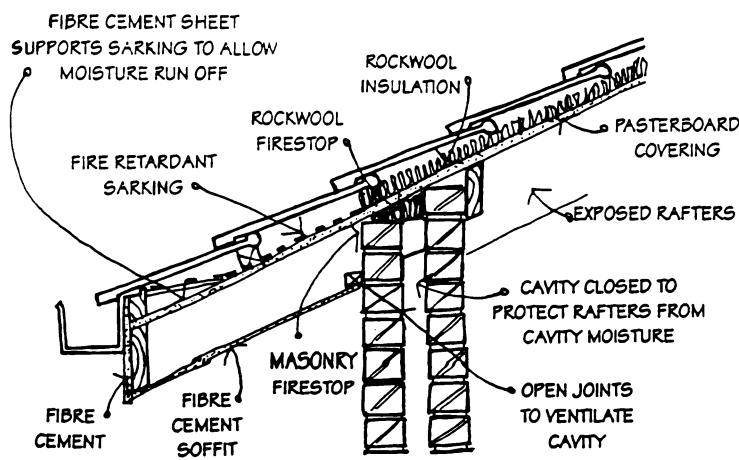
FIRE PROTECTION ZONE



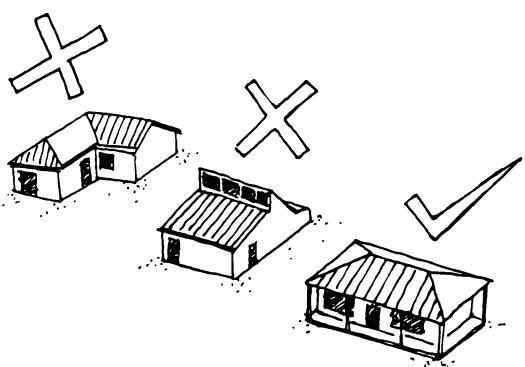
RURAL SITE PLANNING



PREVENTING THE PASSAGE OF SPARKS & EMBERS TO THE INTERIOR



BUILDINGS SHOULD BE EITHER SQUARE OR RECTANGULAR IN SHAPE TO AVOID RE-ENTRANT CORNERS



ROOFLINES SHOULD BE AS SMOOTH AS POSSIBLE

ELEMENT: AIR QUALITY

Element Objective

To provide controls to ensure development within the rural lands contributes to the maintenance of good air quality.

Performance Criteria

Development undertaken in the rural lands should not impact upon the air quality of the region.

Measures to prevent localised air pollution from dust and other air borne particles should be incorporated into activities which have the potential to cause air pollution.

Prescriptive Measures

Development proposals that may impact upon local or regional air quality should include an assessment of the impacts and the proposed means of reducing these impacts.

Work undertaken in the rural lands should consider the relationship between the activity and those factors that influence air quality, such as dust, water and wind.

ELEMENT: CONTRIBUTIONS

Element Objective

To ensure that an appropriate level of provision of amenities and services occurs within the Shire.

Performance Criteria

Funding for provision of community facilities, traffic management, drainage, open space and recreation will be sought in accordance with Councils' Development Contributions Plan 1993.

Prescriptive Measures

For attached dwellings or subdivision the Development Contributions under Section 94 of the Environmental Planning and Assessment Act 1979 will be required prior to release of the building application or the linen plan of subdivision and are provided below.

District	Area (suburbs)	Contribution
District 6	Dural (Rural), Galston, Arcadia, Glenorie, Wisemans Ferry	\$2,827.33 per additional dwelling \$3,958.26 per additional allotment

Note:

(i) These contributions are subject to indexing and may be amended by subsequent Development Contributions Plan.

(ii) A Berowra Creek catchment remediation fee may also be levied.

APPENDIX A

DESIGNATED DEVELOPMENT

The following descriptions define designated developments that could be likely to occur within the rural area and has been extracted from Schedule 3 of the Environmental Planning and Assessment Regulation, 1994.

Agricultural produce industries that process agricultural produce (including dairy products, seeds, fruit, vegetables or other plant material) and:

- (1) crush, juice, grind, mill or separate more than 30,000 tonnes of produce per annum; or
- (2) release effluent, sludge or other waste:
 - (a) in or within 100 metres of a natural waterbody or wetlands; or
 - (b) in an area of:
 - (i) high watertable; or
 - (ii) highly permeable soils; or
 - (iii) acid sulphate, sodic or saline soils.

Aquaculture or mariculture for the commercial production (breeding, hatching, rearing, or cultivation) or marine, estuarine or fresh water organisms, including aquatic plants or animals (such as fin fish, crustaceans, molluscs or other aquatic invertebrates), involving:

- (1) supplemental feeding in:
 - (a) tanks or artificial waterbodies:
 - (i) located in areas of:
 - * high watertable; or
 - * acid sulphate soils; or
 - (ii) with a total water storage area of more than 2 hectares or a total water volume of more than 40 megalitres:
 - * located on a floodplain; or
 - * that release effluent or sludge into a natural water body or wetlands or into groundwater; or
 - (iii) with a total water storage area of more than 10 hectares or a total water volume or more than 400 megalitres; or
 - (b) any other waterbody (except for trial projects that operate for a maximum period of 2 years and are approved by the Director of NSW Fisheries); or
- (2) farming of species not indigenous to New South Wales located:
 - (a) in or within 500 metres of a natural waterbody or wetlands; or
 - (b) on a floodplain; or
- (3) establishment of new areas for lease under the Fisheries and Oyster Farms Act 1935 or the Fisheries Management Act 1994:
 - (a) with a total area of more than 10 hectares and that in the opinion of the consent authority, are likely to cause significant impacts:
 - (i) on the habitat value or the scenic value; or
 - (ii) on the amenity of the waterbody by obstructing or restricting navigation, fishing or recreational activities; or
 - (iii) because other leases are within 500 metres; or
 - (b) with a total area of more than 50 hectares.

Artificial waterbodies

- (1) with a maximum surface area of water of more than 0.5 hectares located:
 - (a) in or within 40 metres of a natural waterbody, wetlands or an environmentally sensitive area; or
 - (b) in an area of:
 - (i) high watertable; or
 - (ii) acid sulphate, sodic or saline soils; or
- (2) with a maximum aggregate surface area of water or more than 20 hectares or a maximum total water volume of more than 800 megalitres; or
- (3) if more than 30,000 cubic metres per annum of material is to be removed from the site.

Extractive industries that obtain extractive materials by methods including excavating, dredging, tunnelling or quarrying or that store, stockpile or process extractive materials by methods including washing, crushing, sawing or separating and:

- (1) obtain or process for sale, or reuse, more than 30,000 cubic metres of extractive material per annum; or
- (2) disturb or will disturb a total surface area of more than 2 hectares of land by:
 - (a) clearing or excavating; or
 - (b) constructing dams, ponds, drains, roads or conveyors; or
 - (c) storing or depositing overburden, extractive material or tailings; or
- (3) are located:
 - (a) in or within 40 metres of a natural waterbody, wetlands or an environmentally sensitive area; or
 - (b) within 200 metres of a coastline; or
 - (c) in an area of:
 - (i) contaminated soil; or
 - (ii) acid sulphate soil; or
 - (d) on land that slopes at more than 18 degrees to the horizontal; or
 - (e) if involving blasting, within:
 - (i) 1,000 metres of a residential zone; or
 - (ii) 500 metres of a dwelling not associated with the development; or
 - (f) within 500 metres of the site of another extractive industry that has operated during the last 5 years.

This designation of extractive industries does not include:

- (a) extractive industries on land to which the following environmental planning instruments apply:
 - (i) Sydney Regional Environmental Plan No. 11 - Penrith Lakes Scheme;
 - (ii) Western Division Regional Environmental Plan No. 1 - Extractive Industries; or
- (b) maintenance dredging involving the removal of less than 1,000 cubic metres of alluvial material from oyster leases, sediment ponds or dams, artificial wetlands or deltas formed at stormwater outlets, drains or the junction of creeks with rivers provided that:
 - (i) the extracted material does not include contaminated soil or acid sulphate soil; or
 - (ii) any dredging operations do not remove any seagrass or native vegetation; or
 - (iii) there has been no other dredging within 500 metres during the past 5 years; or
- (c) extractive industries undertaken in accordance with a plan of management (such as river, estuary, land or water management plans) provided that:
 - (i) the plan is:
 - * prepared in accordance with guidelines approved by the Director of Planning and includes consideration of cumulative impacts, bank and channel stability, flooding, ecology and hydrology of the area to which the plan applies; and
 - * approved by a public authority and adopted by the consent authority; and
 - * reviewed every 5 years; and
 - (ii) less than 1,000 cubic metres of extractive material is removed from any potential extraction site that is specifically described in the plan; or
- (d) continued operations within the meaning of State Environmental Planning Policy No. 37 - Continued Mines and Extractive Industries in respect of which an application for development consent has been made before the end of the moratorium period prescribed under that Policy; or
- (e) artificial waterbodies, contaminated soil treatment works, turf farms, or waste management facilities or works, specifically listed elsewhere in this Schedule.

Livestock intensive industries, being:

- (1) feedlots that accommodate in a confinement area and rear or fatten (wholly or substantially) on prepared or manufactured feed, more than 1,000 head of cattle, 4,000 sheep or 400 horses (excluding facilities for drought or similar emergency relief); or
- (2) piggeries that:
 - (a) accommodate more than 200 pigs or 20 breeding sows and are located:
 - (i) within 100 metres of a natural waterbody or wetlands; or
 - (ii) in an area of:
 - * high watertable; or
 - * highly permeable soils; or
 - * acid sulphate, sodic or saline soils; or
 - (iii) on land that slopes at more than 6 degrees to the horizontal; or

- (iv) within a drinking water catchment; or
 - (v) on a floodplain; or
 - (vi) within 5 kilometres of a residential zone and, in the opinion of the consent authority, having regard to topography and local meteorological conditions, are likely to significantly affect the amenity of the neighbourhood by reason of noise, odour, dust, traffic or waste; or
 - (b) accommodate more than 2,000 pigs or 200 breeding sows; or
- (3) Poultry farms for the commercial production of birds (such as domestic fowls, turkeys, ducks, geese, game birds or emus), whether as meat birds, layers or breeders and whether as free range or shedded birds, that are located:
- (a) within 100 metres of a natural waterbody or wetlands; or
 - (b) within a drinking water catchment; or
 - (c) within 500 metres of another poultry farm; or
 - (d) within 500 metres of a residential zone or 150 metres of a dwelling not associated with the development and, in the opinion of the consent authority, having regard to topography and local meteorological conditions, are likely to significantly affect the amenity of the neighbourhood by reason of noise, odour, dust, lights, traffic and waste.

Mines that mine, process or handle minerals (being minerals within the meaning of the Mining Act 1992 other than coal or limestone) and:

- (1) disturb or will disturb a total surface area of more than 4 hectares of land (associated with a mining lease or mineral claim or subject to a Section 8 notice under the Mining Act 1992) by:
 - (a) clearing or excavating; or
 - (b) constructing dams, ponds, drains, roads, railways or conveyors;
 - (c) storing or depositing overburden, ore or its products or tailings; or
- (2) are located:
 - (a) in or within 40 metres of a natural waterbody, wetlands, a drinking water catchment or an environmentally sensitive area; or
 - (b) within 200 metres of a coastline; or
 - (c) if involving blasting, within:
 - (i) 1,000 metres of a residential zone; or
 - (ii) 500 metres of a dwelling not associated with the mine; or
 - (d) within 500 metres of another mining site that has operated during the past 5 years; or
 - (e) so that, in the opinion of the consent authority, having regard to topography and local meteorological conditions, the mine is likely to significantly affect the environment because of the use or production of substances classified as poisonous in the Australian Dangerous Goods Code.

The designation of mines does not include continued mines within the meaning of State Environmental Planning Policy No. 37 - Continued Mines and Extractive Industries in respect of which an application for development consent has been made before the end of the moratorium period prescribed under that Policy.

Turf farms that, in the opinion of the consent authority, are likely to significantly affect the environment because of their location:

- (1) within 100 metres of a natural waterbody or wetlands; or
- (2) in an area of:
 - (i) high watertable; or
 - (ii) acid sulphate, sodic or saline soils; or
- (3) within a drinking water catchment; or
- (4) within 250 metres of another turf farm.

APPENDIX B

RECOMMENDED NOISE LEVELS

The following guidelines have been extracted from the Environmental Protection Authorities "Environmental Noise Control Manual (1985)".

Based on the land use of the predominant receiver applicants should determine the recommended outdoor background noise levels from Table 1, then after measuring the acoustic environment and comparing the results with Table 2. Table 2 provides the actual permitted noise level adjusted to take into account existing background noise levels as a result of the proposed new noise source.

Table 1

Recommended Outdoor Background Noise Levels

Zoning of Receiver Area	Predominant Land Use of Receiver Area	Time Period	Acceptable L90 Background Noise Level - dB(A)
Rural	Residential, church, agriculture, etc	Day Night	45 35
Passive Recreation	Picnics, bush walks, etc	Day Night	40 40

Note: From Monday to Saturday, daytime is defined as 7.00am to 10.00pm, and night-time is 10.00pm to 7.00am. On Sundays and Public Holidays daytime is 8.00am to 10.00pm and night-time is 10.00pm to 8.00am.

Table 2

Recommended Planning Levels

A	Background is above relevant acceptable level (from Table 1)	*	preferably, set maximum planning level 10dB(A) or more below acceptable level. * at least, set maximum planning level 10dB(A) below existing background level.
B	Background is at acceptable level	*	set maximum planning level 10dB(A) below existing background level.
C	Background is below acceptable level by:	*	set maximum planning level: 1dB(A) 9dB(A) below acceptable limit 2dB(A) 5dB(A) below acceptable limit 3dB(A) 3dB(A) below acceptable limit 4dB(A) 2dB(A) below acceptable limit 5dB(A) 2dB(A) below acceptable limit 6dB(A) or more 5dB(A) above acceptable limit

Further information on the required noise levels can be obtained from the EPA's "Environmental Noise Control Manual" (1985).

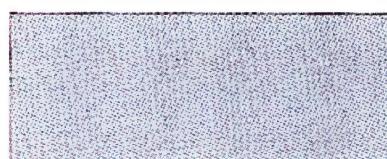
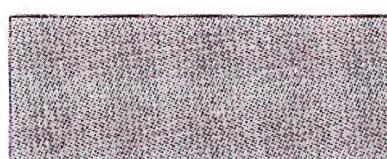
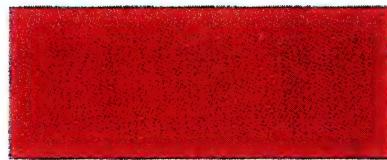
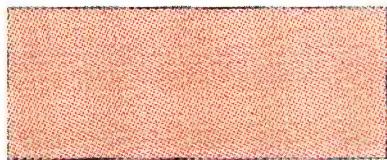
APPENDIX C
SIGNIFICANT PLANT COMMUNITIES

Community B	-	Eucalyptus piperita-Angophora bakeri, open-forest
Community E	-	Eucalyptus sieberi - E. gummiifera - E. haemastoma, woodland
Community H	-	Rock platform heath
Community I	-	Sandstone swamp
Community J	-	Eucalyptus saligna
Community K	-	Eucalyptus pilularis-E. saligna-E. paniculata, tall open-forest
Community N	-	Eucalyptus agglomerata-Angophora costata-Allocasuarina torulosa, open-forest
Community O	-	Warm temperate rainforest
Community P	-	Eucalyptus pilularis-Angophora floribunda, tall open-forest
Community S	-	Angophora costata - E. gummiifera - E. umbra, woodland
Community U	-	Eucalyptus robusta, open-forest
Community X	-	Melaleuca ericifolia, closed-scrub
Community W	-	Mangroves
Community Y	-	Saltmarsh

(refer to the Hornsby Shire Bushland Survey (Smith and Smith 1990) for location of communities)

Appendix 'D'

Colour Pallete



APPENDIX E

VIEWERS EXPERIENCE AND LANDSCAPE CHARACTER TYPES

THE VIEWER'S EXPERIENCE OF THE AREA

Old Northern Road corridor

Things to discourage:

- * Industrial and commercial developments set close to the street;
- * Proliferation of signage and advertising;
- * Urban treatments of street frontages;
- * Loss of view lines and panoramas; and
- * Extractive industry sites in sensitive locations

Things to encourage:

- * Varied set backs from the street for both residential and commercial developments to encourage maintenance of site lines to the surrounding landscape;
- * Landscape treatment to soften the impact of developments and integrate them into the rural landscape;
- * Buildings of rural scale and forms which relate to the local precedents;
- * Reduction in the visual impact of signage. A policy should be developed to control the height, size, colour and placement of signs and advertising materials, consistent with the rural and scenic nature of the corridor, which still allows diversity and local character to continue; and
- * Development of viewing places in important view locations which provide interpretation of the view and safe access.

Canoelands Road Corridor

Things to discourage:

- * Extractive industry sites in sensitive locations; and
- * Loss of view lines and panoramas

Things to encourage:

- * Maintenance of site lines to the surrounding landscape;
- * Landscape treatment to soften the impact of developments and integrate them into the rural landscape;
- * Promotion of the area as a scenic location; and
- * Development of viewing places in important view locations which provide interpretation of the view and safe access.

Galston Road corridor (includes Mid-Dural Road)

Things to discourage:

- * Expansion of Galston village in the south or easterly direction;
- * Proliferation of signage and advertising;
- * Urban treatments of street frontages; and
- * Loss of view lines and panoramas

Things to encourage:

- * Maintenance of a visual buffer zone between residential areas of Galston village and Fagan Park in the Gribbenmount Road area;
- * Development of an urban design policy for the commercial centre of Galston Village which reflects its rural setting, including landscape treatment to soften the impact of developments and integrate them into the rural landscape;
- * Buildings of rural scale and form which relate to the local precedents;

- * Reduction in the visual impact of signage. A policy should be developed to control the height, size, colour and placement of signs and advertising materials, consistent with the rural and scenic nature of the corridor, which still allows diversity and local character to continue; and
- * Development of viewing places in important view locations such as Galston Gorge which provide interpretation of the view and safe access.

Arcadia Road corridor (between Galston Village and Arcadia Park)

Things to discourage:

- * Cluttered developments set close to the road;
- * Proliferation of signage;
- * Urban treatments of street frontages; and
- * Loss of view lines and panoramas.

Things to encourage:

- * Varied set backs from the street for both residential and commercial developments to encourage maintenance of site lines to the surrounding landscape;
- * Landscape treatment to soften the impact of developments and integrate them into the rural landscape;
- * Buildings of rural scale and forms which relate to the local precedents; and
- * Reduction in the visual impact of signage.

Bay Road corridor (between Arcadia Park and Berowra Waters)

Things to discourage:

- * Cluttered developments set close to the road;
- * Proliferation of signage;
- * Prominent industrial and residential developments on visually sensitive ridge top locations;
- * Buildings in sensitive locations using: roof and wall colours which are light or saturated colours of a hue which contrasts to the surroundings, reflective roofs, simple prismatic shapes, extensive associated earth works, no screening vegetation; and
- * Loss of view lines and panoramas

Things to encourage:

- * Maintenance of site lines to the surrounding landscape;
- * Landscape treatment to soften the impact of developments and integrate them into the rural landscape;
- * Buildings of rural scale and forms which relate to the local precedents; and
- * Development of design guidelines to minimise the visual impacts of industrial and residential developments in sensitive ridge top locations

Views from within Marramarra National Park

Things to discourage:

- * Prominent industrial and residential developments on visually sensitive ridge top locations; and
- * Buildings in sensitive locations using: roof and wall colours which are light or saturated colours of a hue which contrasts to the surroundings, reflective roofs, simple prismatic shapes, extensive associated earth works, no screening vegetation.

Things to encourage:

- * Maintenance of site lines to the surrounding landscape;
- * Landscape treatment to soften the impact of developments and integrate them into the natural landscape; and

- * Development of design guidelines to minimise the visual impacts of industrial and residential developments in sensitive ridge top locations.

Hawkesbury River corridor

Things to discourage:

- * Buildings on ridges and highly visible slopes;
- * Buildings with simple prismatic shapes, light colour or saturated colours of a hue which contrasts to the surroundings, reflective roofs, extensive associated earth works and no screening vegetation;
- * Large scale new residences of suburban form which do not compliment the rural setting;
- * Loss of view lines and panoramas;
- * Recreational developments in sensitive locations; and
- * Use of gabion retaining walls in locations prominent from the river.

Things to encourage:

- * Continued agricultural use of the river flats;
- * Use of vegetation to provide screening and reduce the visual bulk and scale of buildings;
- * Buildings of rural scale and forms; and
- * Development of viewing places in important view locations which provide interpretation of the view and safe access.

AREAS OF SCENIC SIGNIFICANCE

Type 1: Mixed Intensive Agriculture

Landform: Broad to moderate gently sloping ridge crests and upper slopes on the plateau top and residual spurs developed on Glenorie soil landscapes.

Land cover: Intensively cleared and cultivated agricultural land on productive soils with few remnants of native vegetation. Vegetation cover is largely of crops and ornamental plants.

Cultural landscape: Closely settled with a small scale grid pattern of subdivision and road layout. Intensive cultivated use of small plots for a variety of uses such as flowers, market gardens, hot house vegetables and nurseries. Built elements include residences, farm buildings, irrigation and earth moving equipment, demountable greenhouses, dams and fences, mostly of wire. Residence vary in architectural style and age, from traditional to suburban, many with Spanish and Mediterranean influences.

Water form: Inconspicuous. Dams, tanks and storages are evidence of the cultural use of water in the landscape.

Landscape character: A fully designed and maintained cultural landscape with few intrinsic natural elements, dominated by horticulture and agricultural production on small holdings. Residences and agricultural buildings are prominent and often undisguised by gardens, with productive landscape coming right up to the structures. Houses are often located away from the road frontage and oriented in the traditional rural manner to take advantage of environmental conditions. Wind breaks and avenues of ornamental and exotic trees are occasionally seen between and within properties. Pines are often the most conspicuous species both by their height, crown form and dark colour. Landscapes have great visual variety at a small scale because of the intensive use of small plots of land for varied uses, often with bare soil, differing crops and growth stages present. Colour, line and texture contrasts between lots and between adjoining properties are common and vary with the seasons. Flowers in farms and nurseries frequently add brilliance and further variations as blocks of colour with varied textures.

Scenic quality issues: Residential and hobby farming conversion of the area has the potential to alter the rural character to one which is less identifiable with the area and more urban. It can have the effect of simplifying the visual elements, decreasing the variety of rural activities and making the landscape appear more open by removing the intensive, small scale of plots which is characteristic of the area. Cultural plantings of wind row species such as pines and other conifers are reaching the end of their lives and native vegetation remnants on road verges are vulnerable to loss following regular mowing and grazing.

Absorption capacity: High for a wide variety of continuing intensive agricultural uses of the land and related residential use of similar form and scale. Moderate for conversion of the landscape to rural residential hobby farming.

Low for exclusively residential use.

Visual sensitivity: High. These areas have high visibility because of the gentle topography and cleared nature of the land. The small scale of blocks and extensive road pattern gives easy visual access to property frontages.

Detracting elements: Over scale new residences of suburban form which do not complement the rural setting.

Urban treatments of the streetscape such as formal gates, "security" entrances and high fences which interrupt or restrict district views.

Excessive hard surfacing.

Strict alignment of new dwellings oriented to the road frontage and with short set backs to the street. Loss of the visual complexity of the landscape by clearing of vegetation and conversion to grassy and manicured surfaces.

Groups of bulky farm buildings and residences close to road frontages (eg. near Arcadia general store, Arcadia Road).

Things to encourage:

- * The maintenance of intensive horticultural and agricultural uses of the land;
- * Maintenance of natural road verges and the regeneration of remnants of natural vegetation which can be found there;
- * Planting, maintenance and replacement of wind row and avenue plantings with appropriate species;
- * Siting of residences to take advantage of site conditions;
- * Building sizes and styles which relate to the rural environment;
- * Traditional treatment of the street frontage of new developments which may include screening vegetation but which preserves sight lines;
- * A variety of building forms which relate to the rural setting and local precedents; and
- * Use of traditional plant species of the area in landscape schemes.

Things to discourage:

- * Excessive bulk and height of buildings;
- * Excessively urban street frontage treatments;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines;
- * Clearing of wind row vegetation and other ornamental plantings;
- * Excessive manicured areas; and
- * Rural industrial land uses

Significance: Regional significance. These landscapes are confined to the Lower Hawkesbury Valley sub-system and are the only examples in the region of the particular combination of cultural elements and Glenorie soil landscapes.

Type 2 - Mixed Agricultural and Rural Residential

Landform: Undulating side slopes below ridge crests on the plateau top and residual spurs often developed on Lucas Heights soil landscapes.

Land cover: Cleared agricultural land on productive soils with remnants of native vegetation on lower slopes, stream margins and gullies. Vegetation cover is varied with pockets of intensive crops but is largely of orchards, pastures and designed or manicured residential landscapes.

Cultural landscape: Varied settlement pattern with a variable scale of lot sizes on a grid pattern of subdivision and road layout. Intensive uses such as flowers, market gardens, hot house vegetables and nurseries are isolated and not prominent. Orchards, grazing land, hobby farms and horse yards are more common. Built elements include residences, farm buildings, demountable greenhouses, dams and fences, mostly with timber rails. Dams, tanks and storages are evidence of the cultural use of water in the landscape. Wind break and avenue plantings are prominent. Residences vary in architectural style and age, from traditional to suburban, many of large scale and with designed landscapes or manicured lawns.

Water form: Inconspicuous, but drainage lines and gullies are marked by natural vegetation.

Landscape character: A rural cultural landscape dominated by larger scale agricultural production and rural industries, hobby farms and rural residences on small holdings. Natural vegetation is an intrinsic element on road verges, creek lines and some hill tops. Agricultural buildings such as packing sheds and demountable greenhouses are prominent. Residences are often surrounded by gardens and properties by post and rail fences. Houses are often located away from the road frontage and oriented in the traditional rural manner to take advantage of environmental conditions. Wind breaks and avenues of ornamental and exotic trees are common. Landscapes have visual variety resulting from the mix of land uses rather than small scale contrasts among adjoining similar uses. Grazed and manicured grassy areas, horses and stables are common. Large residences with designed and managed formal gardens and surrounding landscapes, often set well back from the road, are found within productive agricultural land.

Scenic quality issues: Residential and hobby farming conversion of the area appears to be having the effect of replacing variety of land uses with uniformity, either of grazing land with horses or residential with manicured grassy surroundings. The rural character and diversity could be replaced with a more uniform and more urban character. Cultural plantings of wind row species such as pines and other conifers are reaching the end of their lives and native vegetation remnants on road verges are vulnerable to loss following regular mowing and grazing.

Absorption capacity: High for a variety of continuing agricultural uses of the land and related residential use of similar form and scale.

Moderate for conversion of the landscape to rural residential hobby farming.

Low for exclusively residential use.

Visual sensitivity: Moderate. These areas have medium visibility because of gentle topography, mostly cleared land, but significant levels of native vegetation. The small scale of blocks and extensive road pattern gives easy visual access to property frontages.

Detracting elements:

- * Over scale new residences of suburban form which do not compliment the rural setting;
- * Lack of native vegetation to provide screening and reduce the visual bulk and scale of buildings;
- * Urban treatments of the streetscape such as formal gates, "security" entrances and high fences which interrupt or restrict district views;
- * Loss of the visual complexity of the landscape by clearing of vegetation and conversion to grassy and manicured surfaces both of properties and road verges; and
- * Subdivision and rural residential conversion into small lots

Things to encourage:

- * The maintenance of agricultural uses of the land;
- * Maintenance of natural road verges and of natural vegetation in drainage lines and on properties;
- * Planting, maintenance and replacement of wind row and avenue plantings with appropriate species;
- * Siting of residences to take advantage of site conditions;

- * Building sizes and styles which relate to the rural environment;
- * Traditional treatment of the street frontage of new developments which may include screening vegetation but which preserves sight lines;
- * A variety of building forms which relate to the rural setting and local precedents;
- * Use of plant species which have been traditionally used in the area in landscape schemes; and
- * Establishment of young plants to eventually replace mature native trees left on grazed properties.

Things to discourage:

- * Subdivision sizes which result in residential development of an essentially urban nature;
- * Excessive bulk and height of buildings;
- * Excessively urban street frontage treatments;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines;
- * Clearing of wind row vegetation and other ornamental plantings;
- * Excessive manicured areas; and
- * Rural industrial land uses.

Significance: Local significance. These landscapes are representative of the Hornsby area and appreciated by local people.

Type 3: Orchards and Poultry Farming

Landform: Narrow ridge crests on the plateau top and on spurs often developed on Lucas Heights and Gymea soil landscapes.

Land cover: Small pockets of cleared land on marginal soils among remnants of native vegetation. Often surrounded by natural bushland on lower slopes, stream margins and gullies. Orchards and remnants of previous orchard use and poultry sheds are common.

Cultural landscape: Simple settlement pattern usually following ridge lines closely, with orchard and poultry farms often favouring north facing slopes. Built elements include residences, farm buildings, chicken sheds, dams, tanks, feed silos and fences, mostly of wire. Wind breaks are prominent in areas with orchards. Residences are usually traditional rural vernacular in style without designed landscapes or extensive manicured lawns.

Water form: Inconspicuous.

Landscape character: A landscape dominated by agricultural production of fruit and chickens. Natural vegetation is an intrinsic element on road verges, creek lines and some hill tops. Agricultural buildings such as packing sheds and chicken sheds are prominent. Houses are often located away from the road frontage, related to farm buildings and without formal gardens. Wind breaks of exotic trees are common, particularly of pines. Landscapes have less visual variety than other mixed agricultural areas.

Scenic quality issues: The apparent decline of both rural industries in the area has the potential to change the rural character. Similar areas are already converted either to grazing land with horses or residential with manicured grassy surroundings. The rural character could be replaced with a more uniform and more urban character. Wind rows and other cultural plantings are vulnerable to loss in this process.

Absorption capacity: High for a variety of continuing agricultural uses of the land and related residential use of similar form and scale.

Moderate for conversion of the landscape to rural residential hobby farming.

Visual sensitivity: Moderate to low. These areas have medium to low visibility because of significant levels of surrounding native vegetation and the screening effect of orchard trees.

Detracting elements: Over scale new residences of suburban form which do not compliment the rural setting.

Loss of the visual complexity of the landscape by clearing of vegetation and conversion to grassy and manicured surfaces both of properties and road verges.

Subdivision and rural residential conversion into small lots

Things to encourage:

- * The maintenance of agricultural uses of the land;
- * Maintenance of natural road verges and of natural vegetation in drainage lines and on properties;
- * Planting, maintenance and replacement of wind row and avenue plantings with appropriate species;
- * A variety of building forms which relate to the rural setting and local precedents;

Things to discourage:

- * Subdivision sizes which result in residential development of an essentially urban nature;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines;
- * Clearing of wind row vegetation and other ornamental plantings; and
- * Excessive manicured areas.

Significance: Local significance: These landscapes contribute to the rural quality of the area and are becoming rare.

Type 4: Intensive Orchard Landscapes

Landform: Narrow ridge crests and saddles on the plateau top and on residual spurs, often developed on sandy loam Lucas Heights soil landscapes.

Land cover: Orchards of citrus and stone fruits are prominent. These use modern techniques of establishment and culture with close spaced trees of columnar form. Some associated grazing land grades into native vegetation on lower slopes.

Cultural landscape: Linear settlement pattern following the ridge lines. Intensive orcharding use of the land. Built elements include residences, farm buildings, dams and fences. Wind break and avenue plantings are not prominent.

Water form: Inconspicuous.

Landscape character: A rural cultural landscape dominated by orchards and rural residences on small holdings in a natural setting. Natural vegetation is the major intrinsic element of the larger view. Landscapes have visual interest from the geometry, line, texture and colour contrasts which occur between the orchards and the natural surroundings, but little variety.

Scenic quality issues: These areas are in the process of active change in their character, while remaining within the rural genre. Intensive re-use of these areas for orchards ensures a stable visual character for them at present.

Absorption capacity: High for a variety of continuing agricultural uses of the land and related residential use of similar form and scale.

Low for conversion of the landscape to rural residential hobby farming.

Very low for exclusively residential use.

Visual sensitivity: Moderate. These areas have medium to high visibility because of their topographic situation, but are isolated in areas without large numbers of potential viewers.

Detracting elements: Few.

- * Earth works and quarries such as Len's Dam Place; and

- * Some residences are in prominent positions frequently without surrounding designed landscapes and could benefit from screening from the roads.

Things to encourage:

- * The continued redevelopment of agricultural uses of the land;
- * Maintenance of natural road verges and of natural vegetation;
- * Building sizes and styles which relate to the rural environment;
- * A variety of building forms which relate to the rural setting and local precedents; and
- * Establishment of young plants to eventually replace mature native trees left on grazed parts of properties.

Things to discourage:

- * Subdivision sizes which result in residential development of an essentially urban nature;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines; and
- * Rural industrial land uses.

Significance: Local significance. These landscapes are outstanding local examples of a type which is not common in the Hornsby Area.

Type 5: Active conversion of Orchard and Poultry Farms to Hobby Farms

Landform: Undulating side slopes below ridge crests on the plateau top and residual spurs often developed on Lucas Heights and Gymea soil landscapes.

Land cover: Cleared agricultural land on previously productive soils which are in the process of conversion to grassy, open landscapes.

Cultural landscape: Varied settlement pattern with a variable scale of lot sizes. Grazing land, hobby farms, horse yards and remnants of orchards and poultry farming are common. Built elements include residences, farm buildings, stables and yards, dams and fences, and remnants of poultry sheds. New fences are mostly with timber rails. Wind break and avenue plantings are prominent features of the previous land use. Residences vary in architectural style and age, from traditional to suburban, many of large scale and with designed landscapes or manicured lawns.

Water form: Inconspicuous, but drainage lines and gullies are marked by natural vegetation.

Landscape character: A rural cultural landscape dominated by hobby farms and rural residences on small holdings. Natural vegetation is an intrinsic element on road verges, creek lines and some hill tops. New residences are often surrounded by gardens and properties by post and rail fences. Wind breaks and avenues previously associated with orchards are common. Landscapes have less visual variety as they are converted from agricultural use. Grazed and manicured grassy areas, horses and stables are common among remnants of the previous land use.

Scenic quality issues: Residential and hobby farming conversion of the area has the effect of replacing variety with uniformity, and diversity of land cover with the openness and simplicity of grazed paddocks or residences with manicured grassy surroundings. Cultural plantings and native vegetation remnants are vulnerable to loss following clearing, filling, recontouring, regular mowing and grazing.

Absorption capacity: Moderate for conversion of the landscape to rural residential hobby farming with a variety of land covers.

Low for exclusively residential use.

Visual sensitivity: High. These areas have high visibility because of mostly cleared land. The small scale of blocks and extensive road pattern gives easy visual access to property frontages.

Detracting elements: Over scale new residences of suburban form which do not compliment the rural setting.

Urban elements of the streetscape such as formal gates, "security" entrances and high fences which disrupt or restrict district views

Loss of the visual complexity of the landscape by clearing of vegetation and conversion to grassy and manicured surfaces both of properties and road verges.

Subdivision and rural residential conversion into small lots

Things to encourage:

- * The maintenance of varied and productive agricultural uses of the land;
- * Maintenance of natural road verges and of natural vegetation in drainage lines and on properties;
- * Planting, maintenance and replacement of wind row and avenue plantings with appropriate species;
- * Siting of residences to take advantage of site conditions;
- * Building sizes and styles which relate to the rural environment;
- * Traditional treatment of the street frontage of new developments which may include screening vegetation but which preserves sight lines;
- * A variety of building forms which relate to the rural setting and local precedents;
- * Use of plant species which have been traditionally used in the area in landscape schemes; and
- * Establishment of young plants to eventually replace mature native trees left on grazed properties.

Things to discourage:

- * Subdivision sizes which result in residential development of an essentially urban nature;
- * Excessive bulk and height of buildings;
- * Excessively urban street frontage treatments;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines;
- * Clearing of wind row vegetation and other ornamental plantings;
- * Excessive manicured areas; and
- * Rural industrial land uses.

Significance: Local significance. These areas are characteristic of the Hornsby area, have low visual absorption capacity and high sensitivity.

Type 6: Rural Residential on Marginal Land

Landform: Side slopes and tips of narrow ridges below the plateau top where the underlying Hawkesbury sandstone occurs at the surface. Soil landscapes are generally of the Gymea and Hawkesbury type.

Land cover: Natural woodland and forest vegetation, sometimes selectively cleared for rough grazing. Gully vegetation may include shale-influenced species. Often surrounded by natural landscapes of reserves or national parks.

Cultural landscape: Simple linear settlement pattern following ridge crests and dead-end roads. Residences and their natural or designed landscapes are the most prominent elements. Built elements include residences, sheds and garages, pools and paving. Residences vary in architectural style and age, but are mostly urban in form, many of very large scale and with designed landscapes or manicured lawns.

Water form: Inconspicuous, but drainage lines and gullies are marked by natural vegetation.

Landscape character: A secluded residential landscape in a bush setting with a generally harmonious relationship between residences and the natural landscape. Natural vegetation is an intrinsic element among which residences and designed landscapes are found. Residences are often surrounded by gardens and located away from the road frontage. Ornamental and exotic plantings

are common but tend to be subordinate to the native bush setting. Landscapes have visual variety resulting from the mix of residential and garden styles.

Scenic quality issues: These areas often have little visual impact on the surrounding rural landscapes because they are hidden by topography and vegetation. Their expansion into areas of the plateau which have more rural character would be undesirable.

Absorption capacity: High for residential uses of similar form and scale. Moderate for exclusively residential use, provided the density is kept low.

Visual sensitivity: Low. These areas have low visibility because of their location below the plateau top, steeper topography, natural vegetation cover and location which is often near the end of "dead end" roads.

Detracting elements: Over scale new residences of suburban form which do not compliment the rural setting.

Urban treatments of the streetscape such as formal gates, "security" entrances and high fences.

Loss of the visual complexity of the landscape by clearing of vegetation and conversion to grassy and manicured surfaces both of properties and road verges.

Things to encourage:

- * Siting of residences to reduce visibility from roads;
- * Treatment of the street frontage of new developments which may include screening vegetation but which preserves sight lines; and
- * A variety of building forms.

Things to discourage:

- * Subdivision sizes and designs which result in residential development of an essentially urban nature;
- * Excessively urban street frontage treatments;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines; and
- * Excessive manicured areas and mown verges.

Significance: Local significance. These areas add to the variety of visual elements in the area.

Type 7: Alluvial Agricultural Lands

Landform: Virtually flat alluvial deposits on the inside of major bends in the river.

Land cover: Cleared agricultural land on productive soils, with remnant orchards and stands of native vegetation, particularly she oak and mangrove forests, near the water's edge. Land is used mostly for grazing.

Cultural landscape: Very low settlement density with no formal road pattern. Development consists of residences and rural properties with one recreational facility, a ski park. Land is in grazing use. Built elements include residences and farm buildings, mostly without formal gardens or landscapes. Residences vary in architectural style and age, from traditional to suburban.

Water form: River action has created the landscape at all scales, both the spectacular river valley and the alluvial flats.

Landscape character: A rural cultural landscape dominated by the spectacular natural environment into which the cultural elements fit harmoniously but are subordinate. Residences and farm building vary in prominence depending on being viewed from road or water. Houses are often located away from the road frontage and oriented in the traditional rural manner to take advantage of views and breezes. Landscapes of the flats have little visual variety of topography, vegetation or land use.

Scenic quality issues: Residences and recreational facilities are highly visible from the waterway and in some cases Singleton's Road. The rural character of the area could easily be changed by relatively modest development such as low density residential subdivision or recreational resorts.

Absorption capacity: Moderate for a variety of continuing agricultural uses of the land and related residential use of similar form and scale.

Low for conversion of the landscape to rural residential hobby farming.

Very low for exclusively residential or intensive recreational uses.

Visual sensitivity: High. These areas have high visibility because of gentle topography, mostly cleared land, and long view lines from the river and roads.

Detracting elements: Over scale new residences of suburban form which do not complement the rural setting.

Urban treatments of the streetscape such as formal gates, "security" entrances and high fences which interrupt or restrict district views.

Things to encourage:

- * The maintenance of agricultural uses of the land;
- * Maintenance of natural road verges and of natural vegetation in drainage lines and on properties;
- * Siting of residences to retain view lines from the river;
- * Building sizes and styles which relate to the rural environment;
- * A variety of building forms which relate to the rural setting and local precedents; and
- * Establishment of young plants to eventually replace mature native trees left on grazed properties.

Things to discourage:

- * Subdivision sizes which result in residential development of an essentially urban nature;
- * Excessive bulk and height of buildings;
- * Excessively urban street frontage treatments;
- * Buildings set too close to the road; and
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines.

Significance: State significance. These landscapes are part of a landscape of acknowledged high scenic value and are also rare in the local area.

Type 8: Alluvial Wetlands

Landform: Essentially flat alluvial tidal wetlands with lagoons and tidal creeks developed on Lane Cove and Mangrove Creek soil landscapes.

Land cover: Natural vegetation of salt marshes and meadows, with fringing forests of she oak and mangrove at the water's edge.

Cultural landscape: Nil.

Water form: Water action is responsible for the production and character of the landscape. Tidal water level changes and the interaction of these with deposition of silt and alluvium by the river, combined with inflows of fresh water from the surrounding area, maintain the natural wetland structure.

Landscape character: A natural river landscape dominated by mixed wetland vegetation.

Scenic quality issues: Maintenance of natural processes and prevention of exploitation of these landscapes is all that is required to retain their character.

Absorption capacity Low.

Visual sensitivity Moderate. These areas have medium visibility from roads and the river because of the open nature of the salt marsh and meadow components. She oak and mangrove forest fringes to the water are variable in density allowing views to penetrate in places.

Detracting elements: Nil

Things to encourage:

- * The maintenance of natural processes and water quality; and
- * Appreciation of the natural qualities of these unusual environments.

Things to discourage:

- * Damaging recreational use of the area; and
- * Any other use.

Significance: State significance. These landscapes are part of a landscape of acknowledged high scenic value and are also rare in the Hornsby area and threatened by decreasing water quality standards.

Type 9: Creek Flood Plains

Landform: Flat to gently undulating alluvial deposits at the mouths of minor streams entering the river, developed on Lane Cove and Mangrove Creek soil landscapes.

Land cover: Naturally treeless wetland vegetation and also cleared land on waterlogged to occasionally inundated soils.

Cultural landscape: Nil. These areas are used for occasional rough grazing and otherwise have few significant cultural elements. Ashdale Creek was the source of water for the historic Singleton's Mill.

Water form: Inconspicuous streams meander through these wetlands or spread into various channels. The most extensive of these streams is Ashdale Creek.

Landscape character: Small and secluded wetland landscapes which are away from the river and roads as visual access, surrounded by precipitous sandstone hills and cliffs with natural vegetation.

Scenic quality issues: The wetlands are vulnerable to degradation caused by clearing and grazing.

Absorption capacity Low. Any developments would be highly visible.

Visual sensitivity Moderate. These areas do not have easy visual access but within them views can be extensive, depending on the vegetation type.

Detracting elements: Few.

Things to encourage: The maintenance of natural processes and water quality.
Reduction in grazing use.

Things to discourage: Destructive recreational use
Grazing and other agricultural use

Significance: State significance. These landscapes are rare in the Hornsby area and threatened by decreasing water quality standards.

APPENDIX F

SUITABLE PLANT SPECIES FOR DRY CONDITIONS AND SHALE SOILS

(Derived from 'Grow What Where', Australian Plant Study Group, 1980)

This list contains plants which should tolerate three to four months of Summer without artificial watering. They have been selected due to their easy availability and suitability to local conditions. To conserve water, also consider mulching, shade trees and contouring to trap rainfall runoff.

PROSTRATE TO 1M

<i>Eriostemon verrucosus</i>	<i>Macrozamia communis</i>
<i>Grevillea baxteri</i>	<i>Melaleuca pulchella</i>
<i>Grevillea ilicifolia</i>	<i>Melaleuca scabra</i>
<i>Grevillea juniperina</i> (prostrate)	<i>Melaleuca thymifolia</i>
<i>Grevillea thelemanniana</i>	<i>Melaleuca violacea</i>
<i>Hardenbergia comptoniana</i>	<i>Micromyrtus ciliata</i>
<i>Hardenbergia violacea</i>	<i>Myoporum parvifolium</i>
<i>Helichrysum bracteatum</i>	<i>Rhagodia nutans</i>
<i>Helipterum roseum</i>	<i>Thryptomene saxicola</i>
<i>Leptospermum juniperinum</i> var. <i>horizontalis</i>	<i>Xanthorrhoea australis</i>

1M to 2M

<i>Acacia myrtifolia</i>	<i>Grevillea lavandulacea</i>
<i>Acacia suaveolens</i>	<i>Grevillea rosmarinifolia</i> (form)
<i>Callistemon viminalis</i> 'Captain Cook'	<i>Leptospermum rotundifolium</i>
<i>Eriostemon myoporoides</i>	<i>Leptospermum squarrosum</i>
<i>Grevillea alpina</i> (form)	<i>Melaleuca steedmanii</i>
<i>Grevillea aquifolium</i>	<i>Melaleuca wilsonii</i>
<i>Grevillea arenaria</i>	<i>Westringia fruticosa</i>

OVER 2M

<i>Acacia baileyana</i>	<i>Casuarina torulosa</i>
<i>Acacia decurrens</i>	<i>Chamelaucium uncinatum</i>
<i>Acacia elata (shale soils)</i>	<i>Cordyline stricta</i>
<i>Acacia floribunda</i>	<i>Dodonaea viscosa</i>
<i>Acacia glaucescens</i>	<i>Eucalyptus eximia</i>
<i>Acacia iteaphylla</i>	<i>Eucalyptus haemastoma</i>
<i>Acacia longifolia</i>	<i>Eucalyptus leucoxylon rosea</i>
<i>Acacia longifolia var. sophorae</i>	<i>Eucalyptus maculata</i>
<i>Acacia vestita</i>	<i>Eucalyptus sideroxylon rosea</i>
<i>Agonis flexuosa</i>	<i>Grevillea hookerana</i>
<i>Angophora floribunda</i>	<i>Grevillea juniperina (form)</i>
<i>Angophora hispida</i>	<i>Hakea gibbosa</i>
<i>Baeckea virgata</i>	<i>Hakea salicifolia</i>
<i>Banksia ericifolia</i>	<i>Hakea sericea</i>
<i>Banksia marginata</i>	<i>Kunzea ambigua</i>
<i>Banksia serrata</i>	<i>Kunzea baxteri</i>
<i>Brachychiton acerifolius</i>	<i>Lambertia formosa</i>
<i>Brachychiton discolor</i>	<i>Leptospermum laevigatum</i>
<i>Brachychiton populneus</i>	<i>Melaleuca armillaris</i>
<i>Callistemon 'Harkness'</i>	<i>Melaleuca bracteata</i>
<i>Callistemon 'King's Park Special'</i>	<i>Melaleuca hypericifolia</i>
<i>Callistemon macropunctatus</i>	<i>Melaleuca incana</i>
<i>Callistemon viminalis</i>	<i>Melaleuca nesophila</i>
<i>Callitris rhomboidea</i>	<i>Melaleuca stypheioides</i>
<i>Cassia artemisioides</i>	<i>Melia azedarach</i>
<i>Casuarina cunninghamiana</i>	<i>Persoonia pinifolia</i>
<i>Casuarina glauca</i>	<i>Pittosporum undulatum</i>
<i>Casuarina littoralis</i>	<i>Westringia longifolia</i>
<i>Casuarina stricta</i>	

APPENDIX G

HERITAGE ITEMS

In this Appendix:

for the purpose of describing significance, the symbol "L" means local, "R" means regional, "S" means State and "N" means national; and

for the purpose of describing an address, the symbol "X" means adjacent to the address specified.

Note: this list has been extracted from Schedule D of the Hornsby Shire Local Environmental Plan 1994.

Address	Property description	Item	Significance
Arcadia			
89-91 Arcadia Road	Lot 201, D.P.752048	Arcadia General Store	L
109 Arcadia Road	Lot 1, D.P.533940	"Weerona" and garden	L
123 Arcadia Road	Pt. Lot 7, D.P.446220	Mobb's House	L
136 Arcadia Road	Pt. Lot 25, D.P.975148	Arcadia Community Hall	L
138 Arcadia Road	Lot 1, D.P.598637	St. Columb's Anglican Church	L
140 Arcadia Road	Lot 1, D.P.797478 and Lot 1, D.P.597328	Arcadia Public School - original building (excluding other buildings and grounds)	L
26 Blacks Road	Lots 1 and 3, D.P.587065	House	L
58-62 Calabash Road	Lot 233,D.P.752048	Waddell Ridge Group, dwelling remains, cistern, benchmark, rock inscription, field terracing, road terracing, fenceline, footings.	L
3 Cobah Road	Lot 1, D.P.210810	House	L
40-44 Cobah Road	Lots 1-3, D.P.203756	Windbreak and garden	L
Halls Road	Road Reserve	Windbreak	L
1 Halls Road	Lot D, D.P.369476	House	L
2 Smalls Road	Lot 3, D.P.563428	House	L
8-12 Smalls Road	Lot B, D.P.64758	House	L
15 Smalls Road	Lot 2, D.P.564660	House	L
Sunnyridge Road		Windbreak	L
Berrilee			
70-72 Bay Road	Lot A, D.P.399112	"Sandown"	L
Calabash Point			
McCallums Avenue fire trail	Lot 1, D.P.521150	Fretus Hotel ruins	L
McCallums Avenue	Lot 1, D.P.521150 and Lots 78, 163, 168, 185, 194, D.P.752048	Fire trail	L
Dural			
490-498 Galston Road	Lot 2, D.P.504406 and Lot 1, D.P.87092	Swanes Nursery	L
429 Galston Road	Lot 9, D.P.573049	"Koombahla"	L

431 Galston Road	Lot 1, D.P.194542	House	L
432 Galston Road	Lot 4, D.P.554002	"Shamrock Vale"	L
452 Galston Road	Lot 1, D.P.610404	Garden	L
454 Galston Road	Lot 2, D.P.610404	Garden - Kelvin Park	L
11 Harris Road	Lot 1, D.P.507580	"The Croft"	L
671-673 Old Northern Road	Lot 1, D.P.393694	House	L
839-847 Old Northern Road	Lot 2, D.P.592330	House	L
857 Old Northern Road	Pt. Lot C, D.P.349226	House	L
873 Old Northern Road	Lot 2, D.P.541989	House	L
885-887 Old Northern Road	Lot 1, D.P.616947	Cemetery	L
925-935 Old Northern Road	Lot 2, D.P.618271	House	L
937 Old Northern Road	Lot 1, D.P.618271	Former Uniting Church	L
965 Old Northern Road	Lot 1, D.P.589402	St Judes Anglican Church and grounds	R
1169-1171 Old Northern Road	Lot 6, D.P.239758	"Trees"	L
1355 Old Northern Road	Lot 1, D.P.615183	House	L

Galston

37 Arcadia Road	Lot 1, D.P.632865	Galston Community Centre	L
38-50X Arcadia Road	Lot 1, D.P.558731 and Lot 14, D.P.975148	Fagan Park group, including Netherby, farm buildings, packing shed, brick kiln site, clay pit and bushland	R
39-45 Arcadia Road	Lot 10, D.P.717345	Galston Public School - original building, former teacher's residence and grounds (excluding other buildings)	L
69 Arcadia Road	Lot 14, D.P.577251	"Geelans House"	L
70 Arcadia Road	Lot 3, D.P.574791	House	L
79 Arcadia Road	Lot 1, D.P.565107	"Dumbrell House"	L
138 Arcadia Road	Lot 1, D.P.598637	Grounds - St Columbus Church	L
Bayfield Road		Windbreak	L
Crosslands Road	Road Reserve	Roadworks	L
29 Crosslands Road	Lot 1, D.P.581060	Windbreak	L
54 Crosslands Road	Lot 18, D.P.1056	Fruit trees	L
3 Crusader Road	Lot C, D.P.412743	House	L
Galston Road	Road Reserve	Galston Gorge sandstone buttressing	L
Galston Road	Road Reserve	Galston Gorge culvert	L
Galston Road	Road Reserve	Galston Gorge water troughs	L
295 Galston Road	Lot 64, D.P.774512	House	L
357 Galston Road	Pt. Lot B, D.P.338659	Galston Branch Library - former Church.	L
403 Galston Road	Lot 1, D.P.591136	Galston High School - "Waddell Cottage" and water trough (excluding grounds)	R
412X Galston Road	Lot 151, D.P.810018, Lots 197 and 216, D.P.752048	Galston Park and memorial	L
Galston Road	Road Reserve	Windbreak	L
24 Johnson Road	Lot 201, D.P.594075	"Linden"	L
4 Mid-Dural Road	Lot 1, D.P.789383	House	L
10 Mid-Dural Road	Lot 4, D.P.789383	House	L
3-5 Sallaway Road	Lot A D.P.441669	Stone house	L
Sallaway Road	Road Reserve	Culvert	L
Sallaway Road		Banksia cottage quarry	L

Glenhaven			
599-601 Old Northern Road	Pt. Lot E, D.P.412836	Roadside trees	L
Old Northern Road	Road Reserve	Roadside trees	L
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Glenorie			
1313-1317 Old Northern Road	Lot 7, D.P.13439	House	L
1409 Old Northern Road	Lot 5, D.P.752014	Glenorie Memorial Hall (Mission Hall)	L
1475 Old Northern Road	Lot 1, D.P.212137	House	L
1477 Old Northern Road	Pt. Lot A, D.P.344063	Former Church	L
1523 Old Northern Road	Lot 2, D.P.570784	"The Manor"	L
1729 Old Northern Road	Lot 94, D.P.752014	War memorial precinct	L
1847 Old Northern Road	Lots 64 and 65, D.P.752014	House	L
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Middle Dural			
Middle Dural Road	Pt Lot 90, D.P.752048	Bushland reserve	L
1229 Old Northern Road	Lot A, D.P.154144	"Mountain View"	L
1231 Old Northern Road	Lot 5, D.P.250524	"Spring Hill" and garden	L
Old Northern Road		Windbreak south of Coppabella Road	L
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Wiseman's Ferry			
Old Northern Road	Road Reserve	Road, stone wall, escarpment and drain	R
River Road	Lot 1, D.P.733879	Wiseman's Ferry Inn, grounds	R
River Road	Waterway	Cable ferry	L
Singleton Road	Lot 40, D.P.752029	Fords Farm	L
Singleton Road	Lot 26, D.P.59266	Mill Creek Mill ruins	L
Singleton Road	Ms.1526 Sy. G.G. 22/8/1900	Wiseman's Ferry Cemetery	S
Singleton Road	Lots 15 and 44, D.P.752029, Lot 17, D.P. 752029	Singleton's Mill	S
Singleton Road	Lot 8, D.P. 752029	House ruins	L
Singleton Road	Lot 50, D.P.752029	Chimney	L
Singleton Road	Lot 301, D.P.629539	The Lodge	L
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Regional Reserves			
Berowra Valley Bushland Park		Bushland, including the former Elouera Bushland Reserve	S
Marramarra National Park		Bushland	S

SECTION 90 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

(1) In determining a development application, a consent authority shall take into consideration such of the following matters as are of relevance to the development the subject of that development application:-

- (a) the provisions of -
 - (i) any environmental planning instrument;
 - (ii) any draft environmental planning instrument that is or has been placed on exhibition pursuant to section 47(b) or 66(1)(b);
 - (iii) any draft State environmental planning policy which has been submitted to the Minister in accordance with section 37 and details of which have been notified to the consent authority; and
 - (iv) any development control plan in force under section 51A or 72 that applies to the land to which the development application relates;
- (a1) the provisions of -
 - (i) any conservation agreement entered into under the National Parks and Wildlife Act 1974 and applying to the whole or part of the land to which the development application relates; and
 - (ii) any plan of management adopted under that Act for the conservation area to which the agreement relates;
- (b) the impact of that development on the environment (whether or not the subject of an environmental impact statement) and, where harm to the environment is likely to be caused, any means that may be employed to protect the environment or to mitigate that harm;
- (c) the effect of that development on the landscape or scenic quality of the locality;
- (c1) the effect of that development on any wilderness area (within the meaning of the Wilderness Act 1987) in the locality;
- (c2) whether there is likely to be a significant effect on the environment of endangered fauna;
- (d) the social effect and the economic effect of that development in the locality;
- (e) the character, location, siting, bulk, scale, shape, size, height, density, design or external appearance of that development;
- (f) the size and shape of the land to which that development application relates, the siting of any building or works thereon and the area to be occupied by that development;
- (g) whether the land to which that development application relates is unsuitable for that development by reason of its being, or being likely to be, subject to flooding, tidal inundation, subsidence, slip or bush fire or to any other risk;
- (h) the relationship of that development to development on adjoining land or on other land in the locality;
- (i) whether the proposed means of entrance to and exit from that development and the land to which that development application relates are adequate and whether adequate provision has been made for the loading, unloading, manoeuvring and parking of vehicles within that development or on that land;
- (j) the amount of traffic likely to be generated by the development, particularly in relation to the capacity of the road system in the locality and the probable effect of that traffic on the movement of traffic on that road system;
- (k) whether public transport services are necessary and, if so, whether they are available and adequate for that development;
- (l) whether utility services are available and adequate for that development;
- (m) whether adequate provision has been made for the landscaping of the land to which that development application relates and whether any trees or other vegetation on the land should be preserved;
- (m1) whether that development is likely to cause soil erosion;
- (n) any representations made by a public authority in relation to that development application, or to the development of the area, and the rights and powers of that public authority;
- (o) the existing and likely future amenity of the neighbourhood;
- (p) any submission made under section 87;
- (p1) without limiting the generality of paragraph (a), any matter specified in an environmental planning instrument as a matter to be taken into consideration or to which the consent authority shall otherwise have regard in determining the development application;
- (q) the circumstances of the case;
- (r) the public interest; and
- (s) any other prescribed matter.

(2) A reference in this section to development extends to include a reference to the building, work, use or land proposed to be erected, carried out, undertaken or subdivided, respectively, pursuant to the grant of consent to a development application.

Draft Financial Plan

DRAFT FINANCIAL PLAN - RURAL LANDS STUDY

Associated with recommendations contained in the Rural Lands Study, a range of capital works is proposed including augmentation to existing services and amenities. The cost in providing capital works will have implications on Council and community resources generally and on the adopted Council Management Plan.

The costs for capital works as identified have been assessed, quantified and prioritised dependant upon cost benefit to the community and the ability to finance same.

Financial resources available to fund the range of services are or maybe available at a number of levels including State Government, Council, Developers and Private Sector organisations. Examples of each level of funding are detailed hereunder:

1. **State Government:** State Government Departments and instrumentalities provide services and amenities either directly or indirectly through provision, construction grants and subsidies. Examples of each include construction of main roads by the RTA, Water Supply and sewerage by Sydney Water, grants by Department of Community Services for long day child care, subsidies by the Department of Urban Affairs and Planning for regional open space augmentation under the green space programme and grants from the Hawkesbury Nepean Catchment Trust for catchment environmental works.
2. **Hornsby Council:** The range of services rendered by Council to community benefit is detailed in Council's Management Plan under the heading "Principal Activity". These services relate to corporate services, development services, environmental services, public works, recreational services and community services. Funding for these services is derived from rates, grants, fees, charges and loans where appropriate. A similar situation is applicable within Baulkham Hills Shire Council.
3. **Developers:** Developers are required to contribute towards provision of services and amenities where it can be shown as a result of development, a need will be generated for provision of specific service items. The range of services likely to be required and the level of contribution required as a result of development is detailed in Council's adopted Section 94 Contributions Plan. Further, the community may derive an indirect capital work benefit from development activity, not being a monetary contribution, through construction of footpaths, car parking, landscaping etc. The Rural Lands Study and this

financial plan detail works which are not currently included in the Section 94 Contributions Plan, but which will be incorporated, if adopted.

4. **Private Sector:** A range of services and amenities are rendered by the private sector, whether for financial gain or not, to community benefit. Examples of private sector services include service clubs, commercially operated child minding, medical services, shopping transport, etc..

The projects are illustrated on the masterplans for the villages of Galston, Dural, Glenorie and Wisemans Ferry detailed in the Rural Lands Draft Development Control Plan. Table 1 summarises the projects detailed in the masterplans, the cost of providing the project, the cost attributed to Council and priority having regard to cost benefit and Council's financial resources. The priority listed in Table 1 is listed in terms of short term (1 to 5 years), medium term (5 to 10 years) and long term (10 years plus). A detailed breakdown of the cost of individual projects is contained in Appendix A.

The expenditure includes the cost of purchase, installation, construction and maintenance of landscaping works, for a six month period. A number of the projects will require recurrent annual expenditure for maintenance following construction. However, the majority of projects are landscaping projects or upgrading of existing facilities for which maintenance is already undertaken and included in budgets. An estimate of annual recurrent expenditure is also included in the table.

Table 2 provides a summary of the source of funds. Funding from Baulkham Hills Council and the other authorities will be subject to their agreement. The proportion of funding that can be achieved through Section 94 contributions is low, as the level of contribution is based on the expected low population increase.

It should be noted that \$1.25 has been set aside for the extension of Galston Community Centre (\$250,000 p.a for the last 5 years). This amount should be sufficient to fund the extension (\$850,000) and the proposed recreational facilities at Galston Aquatic Centre (\$300,000).

Table 1 - Summary of projects

Project	Cost	Recurrent costs p.a.	Priority	Funding source
GALSTON				
Galston Reserve Improvements	\$63,650	\$1,300	Medium	Council (including S94)
Galston Reserve Tennis courts	\$120,340	\$2,400	Long	Council (including S94)
Library landscaping	\$1,400	\$0	Short	Council
Aquatic Centre upgrade	\$300,000	\$30,000	Medium	Council (monies set aside)
Galston Village Green	(to be determined)		Med - Long	Council, developers
Nancy Place playground	\$25,000	\$500	Medium	Council (including S94)
Park Galston/Acadia Rds landscaping	\$1,100	\$100	Short - Med	Council (including S94)
Galston depot landscaping	\$2,050	\$100	Short - Med	Council
Bus Stables corner landscaping	\$800	\$100	Short - Med	Council (including S94)
Mid Dural Road landscaping	\$3,300	\$100	Short - Med	Council (including S94)
Street trees (Arcadia & Galston Roads)	\$2,800	\$100	Short	Council
Retail Court	\$57,046	\$5,000	Medium	Developers, Council
Community Centre extensions	\$850,000	\$10,000	Short	Council (monies set aside)
Wetland	\$250,000	\$25,000	Medium	Council (including S94), HNCMC
Bicycleways	\$87,500	\$1,000	Medium	Council, RTA
Neighbourhood Park	\$387,530	\$3,500	Med - Long	Council (including S94)
Galston total	\$2,152,516	\$79,200		
DURAL				
Neighbourhood Park (BHSC)	\$85,000	\$0	Medium	BHSC
Works detailed in Dural Village Plan (Appendix B)	\$616,210	\$0	As per adopted plan	Council, BHSC, RTA, Dept Educ.
Dural total	\$701,210	\$0		
GLENORIE				
Entry points	\$12,180	\$0	Short	Council, BHSC
Tourist information area	\$8,650	\$200	Short - Med	Council , tourist board
Cairnes Road park	\$34,500	\$1,000	Medium	Council (including S94)
Community precinct	\$23,800	\$0	Medium	Council (including S94)
Glenorie Reserve	\$60,700	\$5,000	Medium	Council (including S94)
Glenorie Public School	\$500	\$0	Short	Council, Dept Education
Landscaping	\$4,500	\$200	Short - Med	Council (including S94)
Glenorie Park (BHSC)	\$40,000	\$0	Med - Long	BHSC
Glenorie total	\$184,830	\$6,400		
WISEMANS FERRY				
Oval / Park	\$266,448	\$8,000	Med - Long	Council (including S94)
Business area	\$85,118	\$5,000	Medium	Council, BHSC
River Road Street trees	\$8,200	\$200	Short	Council, BHSC
River boardwalk & regeneration	\$40,000	\$5,000	Long	Council, HNCMT
Wisemans Ferry total	\$399,766	\$18,200		
CANOELANDS				
Meeting room	\$90,000	\$2,000	Medium	Council, BHSC
Canolands total	\$90,000	\$2,000		
Grand Total	\$3,528,322	\$105,800		

Table 2 - Source of funds

Project	HSC Section 94	HSC Allocated	HSC Capt works	BHSC	Dept Ed	RTA	HNCMT	Developers	NSW Tourism
GALSTON									
Galston Reserve improvements	\$6,365		\$57,285						
Galston Reserve Tennis courts	\$12,034		\$108,306						
Library landscaping			\$1,400						
Aquatic Centre upgrade		\$300,000							
Galston Village Green	(to be determined)								
Nancy Place playground	\$2,500		\$22,500						
Park Galston/Acadia Rds landscaping	\$110		\$990						
Galston depot landscaping	\$2,050								
Bus Stables corner landscaping	\$80		\$720						
Mid Dural Road landscaping	\$330		\$2,970						
Street trees (Arcadia & Galston Roads)			\$2,800						
Retail Court			\$28,523					\$28,523	
Community Centre extensions		\$850,000							
Wetland	\$11,500		\$103,500				\$20,000		
Bicycleways	\$4,375		\$39,375			\$43,750			
Neighbourhood Park	\$38,753		\$348,777						
Galston total	\$78,097	\$1,150,000	\$717,146	\$0	\$0	\$43,750	\$20,000	\$28,523	\$0
DURAL									
Neighbourhood Park (BHSC)			\$85,000						
Works detailed in Dural Village Plan (Appendix B)			\$259,938	\$220,563	\$26,500	\$109,208			
Dural total	\$0	\$0	\$259,938	\$305,563	\$26,500	\$109,208	\$0	\$0	\$0
GLENORIE									
Entry points	\$305		\$5,786	\$6,090					
Tourist information area			\$4,325						\$4,325
Cairnes Road park	\$1,725		\$32,775						
Community precinct	\$1,190		\$22,610						
Glenorie Reserve	\$3,035		\$57,665						
Glenorie Public School			\$250			\$250			
Landscaping	\$225		\$4,275						
Glenone Park (BHSC)			\$40,000						
Glenorie total	\$6,480	\$0	\$127,686	\$46,090	\$250	\$0	\$0	\$0	\$4,325
WISEMANS FERRY									
Oval / Park	\$55,954		\$210,494						
Business area			\$42,559	\$42,559					
River Road Street trees			\$4,100	\$4,100					
River boardwalk & regeneration			\$20,000				\$20,000		
Wisemans Ferry total	\$55,954	\$0	\$277,153	\$46,659	\$0	\$0	\$20,000	\$0	\$0
CANOELANDS									
Meeting room			\$45,000	\$45,000					
Canolands total	\$0	\$0	\$45,000	\$45,000	\$0	\$0	\$0	\$0	\$0
Cumulative Totals	\$140,530	\$1,150,000	\$1,426,922	\$443,312	\$26,750	\$152,958	\$40,000	\$28,523	\$4,325
Grand total	\$3,413,321								

Appendix A					
Estimated costs					
Item	No.	Unit	Rate	Item total	Total
GALSTON					
Council depot					
Mass planting	250	m2	\$5.00	\$1,250.00	
Mature planting	20	Item	\$40.00	\$800.00	
Sub-total					\$2,050.00
Mid-Dural Road Reserve					
Mass planting	500	m2	\$5.00	\$2,500.00	
Mature planting	20	Item	\$40.00	\$800.00	
Sub-total					\$3,300.00
Bus Stables Corner					
Gateway tree planting	20	Item	\$40.00	\$800.00	
Sub-total					\$800.00
Galston library					
Planting of peach trees	10	Item	\$140.00	\$1,400.00	
Sub-total					\$1,400.00
Park cnr Galston & Arcadia Roads					
Mass planting	100	m2	\$5.00	\$500.00	
Mature planting	15	Item	\$40.00	\$600.00	
Sub-total					\$1,100.00
Galston Road Reserve					
Mature planting	15	Item	\$40.00	\$600.00	
Sub-total					\$600.00
Nancy Place Playground					
New playground equip, picnic shelter, fencing, planting etc				\$25,000.00	
Sub-total					\$25,000.00
Arcadia Road reserve					
Mass planting	200	m2	\$5.00	\$1,000.00	
Mature planting	30	Item	\$40.00	\$1,200.00	
Sub-total					\$2,200.00
Galston Reserve					
Park sign	1	Each	\$1,000.00	\$1,000.00	
Car park (regraded & new road base)	5	Days	\$1,000.00	\$5,000.00	
Cycle track (2m wide concrete track)	60	m2	\$25.00	\$1,500.00	
Screen planting	30	Item	\$35.00	\$1,050.00	
New playground area (fencing, landscaping)				\$30,000.00	
New picnic shelter	4	Item	\$2,500.00	\$10,000.00	
Exposed agg. concrete paving	100	m2	\$40.00	\$4,000.00	
BBQ & shelter	1	Each	\$5,500.00	\$5,500.00	
Electrical connection to BBQ	1	Item	\$2,000.00	\$2,000.00	
Repaint existing picnic shelter		Item		\$700.00	
Sub-total					\$60,750.00

Galston Aquatic Centre					
Refurbishment		Item		\$150,000.00	
Gym extension		Item		\$100,000.00	
Gym equipment		Item		\$50,000.00	
Sub-total					\$300,000.00
Galston Reserve Netball courts					
Landscaping	200	m2	\$5.00	\$1,000.00	
Log retaining wall (500mm high)	10	m	\$160.00	\$1,600.00	
Access track (timber edging & bitumen)	10	m2	\$30.00	\$300.00	
Sub-total					\$2,900.00
Galston Reserve Tennis courts					
Excavation, base & acrylic painted surface	2	item	\$40,000.00	\$80,000.00	
Environmental Controls	160	m	\$20.00	\$3,200.00	
Seating	5	Item	\$500.00	\$2,500.00	
Fencing (3.6m high chainwire)	160	m	\$70.00	\$11,200.00	
Design, supervision, engineers administration cost				\$10,000.00	
DA application fee		Item		\$500.00	
Mass planting	400	m2	\$5.00	\$2,000.00	
Contingency		10%		\$10,940.00	
Sub-total					\$120,340.00
Neighbourhood Park					
1. Preliminaries					
Design fees (8% of cost)		Item		\$4,200.00	
DA application		Item		\$300.00	
Administration fees (3%)		Item		\$1,400.00	
Survey fees		Item		\$1,000.00	
2. Services					
Water service		Item		\$2,000.00	
Water bubbler		Item		\$200.00	
3. Earthworks					
Excavations, earthworks, drainage	1.5	Day	\$1,300.00	\$1,950.00	
Environmental controls	40	m	\$20.00	\$800.00	
4. Plantings					
Street trees	5	Item	\$30.00	\$150.00	
Mass planting	240	m2	\$5.00	\$1,200.00	
Mature planting	25	Item	\$40.00	\$1,000.00	
5. Playground					
Bullnose brick edging	40	m	\$60.00	\$2,400.00	
Exposed agg. concrete paving	60	m2	\$40.00	\$2,400.00	
Safety surfacing - mulch	25	m3	\$80.00	\$2,000.00	
Play equipment	1	Item	\$17,500.00	\$17,500.00	
Picnic shelter	2	Item	\$2,500.00	\$5,000.00	
Safety fence	30	m	\$120.00	\$3,600.00	
6. Miscellaneous					
Park sign	1	Item	\$700.00	\$700.00	
Seats	2	Item	\$500.00	\$1,000.00	
Boundary fence	100	m	\$35.00	\$3,500.00	
7. Contingency		10%		\$5,230.00	
8. Site					
Land purchase (1650m2)	1650	m2	\$200.00	\$330,000.00	
Sub-total					\$387,530.00

Galston Road Retail Court				
1. Preliminaries				
Design fees (8%)		Item		\$3,300.00
Administration (3%)		Item		\$1,300.00
Survey fees		Item		\$1,500.00
2. Services				
Water		Item		\$2,000.00
Installation of water bubbler	1	Item		\$200.00
Electricity & lighting		Item		\$5,000.00
3. Earthworks				
Excavation, drainage	5	day	\$1,300.00	\$6,500.00
Remove existing bitumen	80	m	\$13.00	\$1,040.00
Rollover kerb & guttering	80	m	\$45.00	\$3,600.00
Tipping fees		Item		\$2,000.00
4. Paving				
Bitumen paving	400	m2	\$25.00	\$10,000.00
Sandstone edging	70	m2	\$145.00	\$10,150.00
5. Furniture				
Seats	5	Item	\$500.00	\$2,500.00
Bins	2	Item	\$200.00	\$400.00
6. Planting				
Mature street trees	15	Item	\$50.00	\$750.00
Tree supports (stake & hessian)	15	Item	\$8.00	\$120.00
Soil	10	m3	\$30.00	\$300.00
Mulch	10	m3	\$40.00	\$400.00
Landscaping (shrubs & ground cover)	50	Item	\$16.00	\$800.00
Project contingency		10%		\$5,186.00
Sub-total				\$57,046.00
Wetland (cnr School & Johnson Roads)				
Estimated cost (100ha catchment)	1	Item	\$250,000.00	\$250,000.00
Sub- total				\$250,000.00
Bicycleways (2m wide)				
Galston Rd (Galston High School to Dural)	2500	m	\$25.00	\$62,500.00
Arcadia Rd (Comm. Centre to Fagan Park)	1000	m	\$25.00	\$25,000.00
Sub- total				\$87,500.00
DURAL				
Neighbourhood Park (BHSC)				\$85,000.00
Sub-total				\$85,000.00
GLENORIE				
Entry Points				
Different carriageway pavement	80	m2	\$120.00	\$9,600.00
Mass planting	60	m2	\$5.00	\$300.00
Mature trees	8	Item	\$35.00	\$280.00
Timber signage	2	Item	\$1,000.00	\$2,000.00
Sub-total				\$12,180.00
Tourist Information area (Cairnes Road)				
Seats	2	Item	\$500.00	\$1,000.00

Tourist board	1	Item	Donated	\$0.00	
Tourist bay signage	2	Item	\$500.00	\$1,000.00	
Mature trees	10	Item	\$35.00	\$350.00	
Mass planting	30	m2	\$5.00	\$150.00	
Earthworks, drainage	2	Day	\$1,300.00	\$2,600.00	
Sandstone edging	10	m	\$145.00	\$1,450.00	
Soil	30	m3	\$40.00	\$1,200.00	
Mulch	30	m3	\$30.00	\$900.00	
Sub-total					\$8,650.00
Community precinct					
Bus bay area					
Screen planting	20	Item	\$30.00	\$600.00	
Mass Planting	20	m2	\$5.00	\$100.00	
Sealed roadway	80	m2	\$25.00	\$2,000.00	
Mountable kerb & gutter	100	m	\$45.00	\$4,500.00	
Concrete footpath	100	m	\$40.00	\$4,000.00	
Drainage		Item		\$10,000.00	
Wal Buckingham gardens					
Screen planting	20	Item	\$30.00	\$600.00	
Picnic shelters	2	Item	\$1,000.00	\$2,000.00	
Sub-total					\$23,800.00
Cairnes Rd Park					
Mass planting	100	m2	\$5.00	\$500.00	
Play equipment		Item		\$25,000.00	
Lighting				\$2,000.00	
Safety fence	30	m	\$120.00	\$3,600.00	
Bush regeneration along watercourse	100	m2	\$34.00	\$3,400.00	
Sub-total					\$34,500.00
Glenorie Primary School					
Screen mass planting	100	m2	\$5.00	\$500.00	
Sub-total					\$500.00
Landscaping					
Street trees	60	Item	\$35.00	\$2,100.00	
Street tree supports & hessian	60	Item	\$10.00	\$600.00	
Road reserve planting	200	m2	\$5.00	\$1,000.00	
Formalised footpath to Taupo Road	20	m	\$40.00	\$800.00	
Sub-total					\$4,500.00
Glenorie Reserve					
Playground area		Item		\$35,000.00	
Picnic shelters	4	Item	\$2,500.00	\$10,000.00	
Mass planting	400	m2	\$5.00	\$2,000.00	
Screen planting	20	m2	\$20.00	\$400.00	
Seating	4	Item	\$500.00	\$2,000.00	
Park sign	1	Item	\$1,000.00	\$1,000.00	
Painting irrigation tank & toilets				\$400.00	
Bicycle track	100	m	\$25.00	\$2,500.00	
Carpark upgrade (resurface)	4	Days	\$1,000.00	\$4,000.00	
Bush regeneration	100	m2	\$34.00	\$3,400.00	
Sub-total					\$60,700.00

Glenorie Park (BHSC)				
Netball / basketball court	1	Item	\$40,000.00	\$40,000.00
Sub-total				\$40,000.00
WISEMANS FERRY				
Wisemans Ferry Oval / Park				
1. Preliminaries				
Design & supervisors fees		Item		\$5,000.00
Administration & Engineers fees		Item		\$5,000.00
DA fees				\$2,500.00
2. Earthworks				
Earthworks, drainage	3	Day	\$1,300.00	\$3,900.00
Environmental controls	40	m	\$20.00	\$800.00
Grading for carpark	2	Day	\$1,300.00	\$2,600.00
Lighting , electricity		Item		\$5,000.00
Water		Item		\$2,000.00
3. Planting				
Oval screen planting	2000	m2	\$5.00	\$10,000.00
Mass planting	1000	m2	\$5.00	\$5,000.00
Mature planting	85	Item	\$35.00	\$2,975.00
4. Playground				
Playground equipment - junoir	1	Item	\$8,000.00	\$8,000.00
Playground equipment - senior	1	Item	\$17,500.00	\$17,500.00
Safety fence - junior	15	m	\$80.00	\$1,200.00
Safety fence - senior	32	m	\$80.00	\$2,560.00
Edging - junior	20	m	\$45.00	\$900.00
Edging - senior	40	m	\$45.00	\$1,800.00
Fencing - junior	28	m	\$80.00	\$2,240.00
Fencing - senior	40	m	\$80.00	\$3,200.00
5. Picnic & BBQ area				
Picnic shelters	6	Item	\$2,500.00	\$15,000.00
BBQ & shelter	2	Item	\$5,500.00	\$11,000.00
BBQ electrical connection	2	Item	\$2,000.00	\$4,000.00
Exposed agg. concrete paving	420	m2	\$40.00	\$16,800.00
Lighting				\$750.00
Water service				\$1,500.00
Seats	5	Item	\$500.00	\$2,500.00
6. Miscellaneous				
Park sign	1	Item	\$1,000.00	\$1,000.00
Tennis resurfacing	750	m2	\$20.00	\$15,000.00
Carpark (20 spaces)	20	space	\$3,000.00	\$60,000.00
River regeneration & landscaping				\$20,000.00
Cycle track	300	m	\$25.00	\$7,500.00
Informal Drive (3mwide compacted road bas	200	m	\$25.00	\$5,000.00
Contingency		10%		\$24,222.50
Sub-total				\$266,447.50
Business area				
1. Preliminaries				
Design fees		Item		\$5,000.00
Administration		Item		\$5,000.00
Survey fees		Item		\$3,000.00
2. Earthworks				
Excavation	3	Day	\$1,300.00	\$3,900.00

Drainage				\$10,000.00	
Kerb & guttering	100	m	\$45.00	\$4,500.00	
Remove existing paving	100	m	\$13.00	\$1,300.00	
Tipping fees		Item		\$2,000.00	
Electricity , lighting				\$10,000.00	
3. Paving					
Bitumen paving	400	m2	\$25.00	\$10,000.00	
Sandstone edging	100	m2	\$145.00	\$14,500.00	
4. Furniture					
Seats	5	Item	\$500.00	\$2,500.00	
Bins	4	Item	\$200.00	\$800.00	
5. Planting					
Mature street trees	20	Item	\$130.00	\$2,600.00	
Tree supports (stake & hessian)	10	Item	\$8.00	\$80.00	
Soil	20	m3	\$30.00	\$600.00	
Mulch	20	m3	\$40.00	\$800.00	
Landscaping (shrubs & groundcover)	50	m2	\$16.00	\$800.00	
Contingency		10%		\$7,738.00	
Sub-total					\$85,118.00
River Road Street tree planting					
Mature poplars	20	Item	\$130.00	\$2,600.00	
Mature eucalypts	100	Item	\$50.00	\$5,000.00	
Tree support & hessian	100	Item	\$6.00	\$600.00	
Sub-total					\$8,200.00
River boardwalk & bush regeneration					
Boardwalk	100	m2	\$200.00	\$20,000.00	
Foreshore vegetation regeneration				\$20,000.00	
Sub-total					\$40,000.00
CANOELANDS					
Meeting room					
Design & construction	80	m2	\$1,000.00	\$80,000.00	
Landscaping				\$10,000.00	
Sub-total					\$90,000.00

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Appendices

APPENDIX A

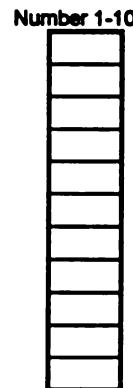
RURAL LANDS - RESIDENTS SURVEY

Residence

1. Could you please mark on the attached map the approximate location of your place of residence/property.
2. How long have you lived in the area? _____ (years)
3. Why did you choose this area as a place to live (eg. farming, lifestyle)?

4. In order of priority, which factors do you feel contribute most to the enjoyment of your area?

Rural setting
Housing affordability
Access to employment
Family and friends
Large land holding
Community atmosphere
Housing styles
Bushland settings
Proximity to waterways
Views
Community and recreation facilities
Other (please specify)



Occupation

5. Is any of the household's income generated from the property? (eg. agriculture, nursery, home industry) (please tick)

Yes No

If yes please describe occupation and activity carried out.

How many people do you employ? Permanently _____
Non-permanently _____
in which season? _____

6. What area of your land is devoted to this activity? (please tick)

Entire property
Part of property (approximate percentage)
Large shed only
Small shed only
Office within dwelling
Other (please specify).....

7. If the household's primary source of income is not generated from the property, in which suburb do you work?

Suburb _____

Occupation _____

Shopping

8. How would you rate the local shopping centre in your area, in terms of the services it provides? (please tick)

Inadequate Adequate More than adequate

9. Approximately what percentage of your household's shopping expenditure is undertaken within the local shopping centre? (please tick)

10% 20% 30% 40% 50% 60% 70% 80% 90%

<input type="checkbox"/>								
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**10. What areas could be improved to attract you to shop in the local shopping centre?
(please tick)**

Range of products
Prices
Customer service
Look of the centre
Parking facilities
Other facilities (please specify)

11. Where do you usually shop? (please tick)

	Groceries	Larger items goods,clothing etc	(white
Arcadia	<input type="checkbox"/>	<input type="checkbox"/>	
Blacktown	<input type="checkbox"/>	<input type="checkbox"/>	
Cherrybrook	<input type="checkbox"/>	<input type="checkbox"/>	
Castle Hill	<input type="checkbox"/>	<input type="checkbox"/>	
Dural	<input type="checkbox"/>	<input type="checkbox"/>	
Galston	<input type="checkbox"/>	<input type="checkbox"/>	
Glenhaven	<input type="checkbox"/>	<input type="checkbox"/>	
Glenorie	<input type="checkbox"/>	<input type="checkbox"/>	
Hornsby	<input type="checkbox"/>	<input type="checkbox"/>	
Kenthurst	<input type="checkbox"/>	<input type="checkbox"/>	
Parramatta	<input type="checkbox"/>	<input type="checkbox"/>	
Round Corner	<input type="checkbox"/>	<input type="checkbox"/>	
Wisemans Ferry	<input type="checkbox"/>	<input type="checkbox"/>	
Other (please specify).....	<input type="checkbox"/>	<input type="checkbox"/>	

Infrastructure

12. Most properties are serviced with electricity and a telephone service but not sewerage and in some areas not water? Do you supplement the supplied household services with:

(please tick)

Spring/bore water
Roof (tank) water
Petrol/diesel generator
Bottled gas
Solar electricity
Solar hot water
Wind generator
Other (please specify)

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13. What type of disposal system do you use for:

Effluent ?

Septic
Pump out
Enviro cycle (or similar)
Composting toilet
Other (please specify)

(please tick)

--	--	--	--

Solid Waste ?

Contract disposal
On-site disposal
Container disposal
240 litre bin
55 litre bin
Other (please specify)

(please tick)

--	--	--	--	--	--

14. Do you recycle (e.g glass, P.E.T, plastic, paper)? (please tick)

Yes

No

15. Do you need to dispose of chemicals including pesticides, herbicides and weedicides? (please tick)

Yes

No

Community facilities

16. Council is faced with a challenge to provide various community facilities which satisfy community needs and aspirations. How would you rate the following community facilities within your area? (please tick)

Inadequate

Adequate

More than Adequate

Library Services
Youth Centres
Childcare
Senior Citizens
Education
Emergency Services
Community Halls
Medical
Other (please specify)

--	--	--	--	--	--	--	--

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17. How often do members of your household use the following community facilities?

	Weekly	Monthly (please tick)	Yearly
Youth Centres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Childcare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Senior Citizens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Libraries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Community Halls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. Open space and recreation is becoming an increasingly important element in the enjoyment and well-being of the community. How would you rate the following open space and recreation facilities within your area? (please tick)

	Inadequate	Adequate	More than Adequate
Regional parks (eg National Parks)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Playing fields	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Playgrounds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sporting facilities (eg tennis, netball)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking trails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Picnic areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waterways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. How often do members of your household use the following open space and recreation facilities? (please tick)

	Weekly	Monthly	Yearly
Regional parks (eg National Parks)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Playing fields	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Playgrounds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sporting facilities (eg tennis, netball)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking trails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Picnic areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waterways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Future Development

20. Rural properties: There has been considerable debate in recent years about the future development of the rural area, including the possibility of further subdivision. In your area do you consider the current subdivision standards to be appropriate? (please tick)

Yes No

What is the area of your property?

(please tick)

10 hectares (25 acres)	<input type="checkbox"/>
5 hectares (12.5 acres)	<input type="checkbox"/>
2 hectares (5 acres)	<input type="checkbox"/>
1 hectare (2.5 acres)	<input type="checkbox"/>
0.5 hectares (1.25 acres)	<input type="checkbox"/>
0.1 hectares (0.25 acres)	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>

What area would you prefer?

(please tick)

10 hectares (25 acres)	<input type="checkbox"/>
5 hectares (12.5 acres)	<input type="checkbox"/>
2 hectares (5 acres)	<input type="checkbox"/>
1 hectare (2.5 acres)	<input type="checkbox"/>
0.5 hectares (1.25 acres)	<input type="checkbox"/>
0.1 hectares (0.25 acres)	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>

Future Planning

21. What do you consider are the major benefits of living in a rural area?

22. What do you consider to be the main disadvantages of living in a rural area?

23. What kind of activities do you consider to be in conflict with your use of the land?

24. Are there any special areas (landmarks, buildings, outlooks, etc) that you feel contribute to the scenic quality of your area? If yes please describe.

25. What issues do you consider to be important in the future planning for the area?

26. Do you have any other comments or ideas? Please feel free to draw any suggestions on the attached map.

Thank you for your time, it would be appreciated if you could return the form in the attached postage paid envelope. If you have any enquires please contact Council's Planning Branch on 847-6726.

APPENDIX B

SUMMARY OF STATE PLANNING POLICIES AND MINISTERIAL DIRECTIONS

State Environmental Planning Policies

No.1 - Development Standards: Applies to the land to the extent that the Council may, in certain circumstances, grant consent to development that does not strictly comply with development standards contained in environmental planning instruments applying to the land.

No.4 - Development Without Consent: Applies to the land to the extent that the need to make a development application in regard to certain specified minor types of development is removed.

No.5 - Housing for Aged or Disabled Persons: This policy makes housing for aged or disabled persons permissible with consent of Council on all urban land and land adjoining urban land where dwelling houses, residential flat buildings, hospitals or special uses - churches are permitted, and other land referred to in clause 7 of the Policy (see policy for details). It establishes development standards and requirements for support services for such housing.

No.6 - Number of Storeys in a Building: A policy for determining the height of a building where height is controlled by reference to the number of storeys.

No.9 - Group Homes: Enables the development of group homes for the purpose of accommodating economically or socially disadvantaged persons on land where dwellings are allowed.

No.11 - Traffic Generating Developments: The aim of this policy is to ensure that the Traffic Authority is consulted relative to certain traffic generating developments.

No.12 - Public Housing (Dwelling Houses): Enables the Housing Commission of New South Wales to erect dwelling houses in residential zones without the necessity for consent to be obtained.

No. 19 - Bushland in Urban Areas: Requires Council to consider potential impact on "urban bushland" by development within or adjoining lands zoned or reserved for public open space purposes.

No. 21 - Caravan Parks: Requires caravan parks to limit number of permanent sites, encourage short stay/tourist sites.

No. 22 - Shops and Commercial premises: In a business zone, permits the change of use with consent from a lawfully used shop or commercial premises to another kind of shop or commercial premise even though the proposed use is prohibited.

No. 30 - Cattle feed lots and piggeries: Cattle feed lots having a capacity of more than 50 head of cattle to require development consent. Feed lots with a capacity between 50-1000 head of cattle to be advertised as per designated development. DA needs to detail measures to prevent pollution.

No. 33 - Hazardous and offensive development: HSLEP incorporates definitions which mean that potentially hazardous or offensive industry and hazardous or offensive industry are included as "industry". In determining DA Council needs to consider circulars or guidelines published by Department of Planning.

No. 34 - Major employment generating industrial development: The Minister for Planning is the consent authority for major employment generating development or for certain development with a capital investment greater than \$20 million.

No. 37 - Continued mines and extractive industries: Requires quarry operators operating under existing use rights to register with Council, submit quarterly production returns and obtain development consent. Sites not registered or operating without consent after 16.6.95 are illegal.

No. 38 - Olympic games projects: Minister for Planning is the consent authority for any Olympic Games projects.

No. 44 - Koala Habitat Protection: Contains provisions aimed at encouraging the conservation and management of areas of natural vegetation that provide habitat for koalas. The policy applies where development consent is required. The policy acts through a series of triggers which either exempt the development from the policy or necessitate further consideration, as follows:

1. Is the site over 1 hectare in area?
2. Is the site a potential Koala habitat? ie. do the Eucalyptus species nominated in the SEPP comprise more than 15% of the trees on the site.
3. Is the site a core Koala habitat? ie. is there a presence of koalas on the subject site (scratch marks and dung).

For sites identified as potential Koala habitats a Fauna Impact Statement (FIS) will be required to address the possibility of core habitat. For sites identified as core Koala habitat a Plan of Management, approved by the Director of Planning, is required prior to determination of the development application.

Draft - Sewerage Works: A public authority may develop sewerage works despite provisions of HSLEP and without consent. Must consult with Council.

Ministerial Directions

The Ministerial Directions pursuant to Section 117 of the Environmental Planning and Assessment Act, 1979 applicable to this study area:

G2 Circulars to Councils: The Department of Planning's Circulars A13, B3-4, B6, B8-9, B13, B17, B19, B26, C1-4, C6, C9-10, C18, C21, D2-3, D10, F2 and F6 are relevant in terms of possible activities and developments within the study area.

G3 Reservations: This Direction requires LEP's not to substantially reduce existing reservations or zonings for public open space, or create, alter or remove existing reservations or zonings for regional/county open space, special use or main, county or arterial road without the approval of the relevant authority and Minister for Planning.

G8 Rural zones: This Direction requires LEP's for rural zones to retain provisions enabling a dwelling to be built on an existing allotment and controls relating to traffic generating developments. The Direction also requires LEP's not to rezone land for urban purposes unless it is justified by an Environmental Study, or is in accordance with the Sydney Region Urban Development Program or the rezoning is of minor significance.

G9 Residential Zones: This Direction requires, inter alia, LEP's to contain provisions requiring residential development to be not permitted until land is adequately serviced with water and sewerage. The Direction also request that provisions permitting dual occupancy development, a variety of housing and not requiring consent for dwelling houses be incorporated into LEP's.

G10 Business Zones: This direction requires that LEP's do not substantially alter the location of, or reduce the zoning of land for business development. The direction also requests that LEP's retain existing floor space ratio controls.

G12 Environmental Protection: This Direction requires LEP's not to alter or remove existing zonings or identification of land for scenic protection areas, environmental protection areas and escarpment preservation areas unless justified by an environmental study.

G20 Planning in Bushfire Prone Areas: This Direction requires Council to consider whether a bushfire hazard exists to the land which the plan applies and if a hazard does exist adopt appropriate development controls.

G21 Conservation of Environmental Heritage and Ecologically Significant Items and Areas: This Direction requires LEP's to contain provisions to facilitate the conservation of buildings, work, relic, place or area identified as being of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance.

G25 Flood Liable Land: This Direction applies to flood liable land where Council's cannot rezone the land to permit residential, business, industrial or special uses, or permit a significant increase in the development of that land.

G26 Residential Allotment Sizes: This Direction requires, unless the Director of Planning is otherwise satisfied, that the provisions relating to subdivision and integrated housing provided under SEPP No.25 are included in Draft LEP's.

APPENDIX C

Sydney Regional Environmental Plan No.20 - Schedule 4 Matters to be considered by consent authority when preparing a River Management Plan

(Cl. 8)	
Water quality	
1. The matters for consideration relating to water quality are the principles of total catchment management, and in particular -	
(a) in relation to on-site disposal of water -	
(i) the need to identify the types of sewage disposal systems appropriate for on-site disposal in the immediate river environment;	(i) the need to encourage the planting of native riverine vegetation along the banks of the river while ensuring an adequate degree of light penetration of the river;
(ii) the need to identify areas where the on-site disposal of effluent is appropriate;	(ii) the need to recognise the important role that river shallows play in water quality in encouraging the growth of attached aquatic plant beds and inhibiting the growth of blue-green algae; and
(iii) the need to provide guidelines on the appropriate siting and maintenance of on-site sewage disposal systems;	(iii) the need to identify and protect river shallows;
(iv) the need to identify appropriate uses for treated effluent; and	(e) in relation to water clarity or turbidity - the effect that development will have on the clarity or turbidity of the river and the effect that such development will have on water quality or fish habitats and bank stability; and
(v) the need to establish a system to monitor the operations of on-site disposal systems and where a monitoring system already exists, the need to give consideration to the adequacies of it;	(f) in relation to flooding - the importance of developing agricultural practices which are intended to minimise the impact of flooding of the river on agricultural production and the need to consult with the Department of Agriculture and Fisheries to identify flood tolerant crops and production methods appropriate for flood liable areas.
(b) in relation to the withdrawal of water - the need to restrict or control development requiring the withdrawal of water because of the effect on the total water budget of the river;	
(c) in relation to runoff -	
(i) the best means of implementing the findings of the Urban Run-Off Study;	(a) the need to establish building setbacks from significant vegetation and wetland habitats;
(ii) the need to implement guidelines prepared by the State Pollution Control Commission to minimise urban runoff; and	(b) the desirability of controlling access to significant vegetation and wetland habitats where these are located in or adjacent to public recreation areas;
(iii) the need to identify agricultural practices that will improve the quality of rural runoff and the desirability of consulting with the Department of Agriculture and Fisheries and the Soil Conservation Service in relation to them;	(c) the permanency of wetlands;
(d) in relation to aquatic habitats -	(d) the range of wildlife inhabiting the vegetation area or wetland;
	(e) the need to preserve the quality of the habitat for indigenous and migratory species;
	(f) the effect that development in the vicinity of significant vegetation or wetland habitats may have on the quality of the wetlands;

- (g) the desirability of establishing a local wetland management committee; and
- (h) the importance of notifying land owners if a significant vegetation area or wetland habitat is located on their property.

Extraction

3. The matters for consideration relating to extraction are -

- (a) the importance of providing guidelines for the management and rehabilitation of those parts of the river under extraction including the need for operators of extractive industries to rehabilitate the river in a manner similar to that required for land-based operators;
- (b) the need for the guidelines referred to in paragraph (a) to include consideration of -
 - (i) the need to maintain river shallows as an essential element for the overall rehabilitation of the river;
 - (ii) the benefits of limiting extraction to small areas of the river in preference to extraction over long stretches of the river;
 - (iii) the advantages of using a cutter-suction method of extraction in preference to the drag-line method;
 - (iv) the need to reduce the visual impact of extractive operations through appropriate tree planting and screening and to reduce the aural impact of such operations through the construction of landform barriers;
 - (v) the effect that extraction will have on river turbidity and the nutrient assimilation capabilities of the river;
 - (vi) the rehabilitation of the river to a batter appropriate for the regrowth and colonisation of attached aquatic plant beds; and
 - (vii) the desirability of replanting attached aquatic plant beds where these have been damaged or lost through extraction;

- (c) the need to identify and outline available alternative sources of medium to coarse sand;
- (d) the need to resolve conflicts that may occur between extractive operations and recreational activities;
- (e) the need to resolve conflict between extractive operations and the character of the river; and
- (f) the need to identify areas that are unsuitable for extraction.

Heritage items and scenic quality

4. The matters for consideration relating to heritage items and scenic quality are -

- (a) the need to identify items of rural heritage significance;
- (b) the need to include provisions which conserve and enhance the environmental and heritage significance of heritage items;
- (c) the desirability of encouraging development that is consistent with the rural character of the immediate river environment and, in particular, the need to encourage appropriate building forms, siting, colours, landscaping and building materials;
- (d) the need to identify features of importance for maintaining the character of the immediate river environment such as prominent vistas, significant vegetation habitats and geological formations;
- (e) the findings of the Department's study on the eastern escarpment of the Blue Mountains entitled "Blue Mountains Eastern Escarpment Study";
- (f) the need to maintain areas of extensive, prominent or significant vegetation to protect the character of the river;
- (g) the need to identify appropriate tree planting along river banks which will aid in bank stability but not reduce the amount of light penetrating the river;
- (h) the need to make appropriate use of heritage items; and
- (i) the desirability of making tree preservation orders for areas where none currently apply.

Recreation and tourism

5. The matters for consideration relating to recreation and tourism are -
- (a) the availability of -
 - (i) vehicle parking and suitable access (including cars and buses);
 - (ii) general stores and kiosks;
 - (iii) boat service areas; and
 - (iv) water, electricity and sewage;
 - (b) the desirability of upgrading existing public access to the river in preference to developing new access points;
 - (c) any feasible alternative methods that may be employed to manage access to the river and the desirability of promoting controlled public access to the river through private property in consultation with the Department of Sport, Recreation and Racing;
 - (d) the need to appropriately locate access points to the river or recreation areas particularly -
 - (i) where river banks are stable;
 - (ii) away from river shallows;
 - (iii) away from major beds of attached aquatic plants;
 - (iv) in areas that are safe for swimming;
 - (v) where fish intrusion is not great;
 - (vi) where proposed activities do not conflict with surrounding recreational activities; and
 - (vii) where significant wildlife and wetland habitats will not be adversely affected;
 - (e) the need to provide a wide range of tourist facilities and the need to provide design guidelines and performance standards for tourist developments;
 - (f) the findings of any relevant strategic plan prepared by the Tourism Commission;
 - (g) the need to identify and signpost roads suitable for inclusion in a tourist road network; and

- (h) the need to provide for and link cycleways and footpaths along river foreshores.

Agriculture

6. The matters for consideration relating to agriculture are -
- (a) the need to promote and maintain prime agricultural land for use in agricultural production;
 - (b) the need to encourage the diversification of crops and the introduction of complementary activities, such as holiday accommodation, so as to promote the viability of farming;
 - (c) the need to protect fish breeding grounds in addition to areas where commercial and recreational fishing occurs;
 - (d) the need to protect areas where oyster farming is carried out; and
 - (e) the need to ensure that land is used according to its capability to prevent its degradation.

APPENDIX D

(Extract from Schedule D of the Hornsby Shire LEP, 1994)

HERITAGE ITEMS

In this table:

for the purpose of describing significance, the symbol "L" means local, "R" means regional, "S" means State and "N" means national; and

for the purpose of describing an address, the symbol "X" means adjacent to the address specified.

Address	Property description	Item	Significance
Arcadia			
89-91 Arcadia Road	Lot 201, D.P.752048	Arcadia General Store	L
109 Arcadia Road	Lot 1, D.P.533940	"Weerona" and garden	L
123 Arcadia Road	Pt. Lot 7, D.P.446220	Mobb's House	L
136 Arcadia Road	Pt. Lot 25, D.P.975148	Arcadia Community Hall	L
138 Arcadia Road	Lot 1, D.P.598637	St. Columb's Anglican Church	L
140 Arcadia Road	Lot 1, D.P.797478 and Lot 1, D.P.597328	Arcadia Public School - original building (excluding other buildings and grounds)	L
26 Blacks Road	Lots 1 and 3, D.P.587065	House	L
58-62 Calabash Road	Lot 233,D.P.752048	Waddell Ridge Group, dwelling remains, cistern, benchmark, rock inscription, field terracing, road terracing, fenceline, footings.	L
3 Cobah Road	Lot 1, D.P.210810	House	L
40-44 Cobah Road	Lots 1-3, D.P.203756	Windbreak and garden	L
Halls Road	Road Reserve	Windbreak	L
1 Halls Road	Lot D, D.P.369476	House	L
2 Smalls Road	Lot 3, D.P.563428	House	L
8-12 Smalls Road	Lot B, D.P.64758	House	L
15 Smalls Road	Lot 2, D.P.564660	House	L
Sunnyridge Road		Windbreak	L
Berrilee			
70-72 Bay Road	Lot A, D.P.399112	"Sandown"	L
Calabash Point			
McCallums Avenue fire trail	Lot 1, D.P.521150	Fretus Hotel ruins	L
McCallums Avenue	Lot 1, D.P.521150 and Lots 78, 163, 168, 185, 194, D.P.752048	Fire trail	L
Dural			
490-498 Galston Road	Lot 2, D.P.504406 and Lot 1, D.P.87092	Swanes Nursery	L
429 Galston Road	Lot 9, D.P.573049	"Koombahla"	L
431 Galston Road	Lot 1, D.P.194542	House	L
432 Galston Road	Lot 4, D.P.554002	"Shamrock Vale"	L
452 Galston Road	Lot 1, D.P.610404	Garden	L
454 Galston Road	Lot 2, D.P.610404	Garden - Kelvin Park	L
11 Harris Road	Lot 1, D.P.507580	"The Croft"	L

New Line Road	Road Reserve	Street trees	L
236 New Line Road	Lot 2, D.P.584938	House	L
260-266 New Line Road	Lot 84, D.P.752053	"Terranova"	L
671-673 Old Northern Road	Lot 1, D.P.393694	House	L
839-847 Old Northern Road	Lot 2, D.P.592330	House	L
857 Old Northern Road	Pt. Lot C, D.P.349226	House	L
873 Old Northern Road	Lot 2, D.P.541989	House	L
885-887 Old Northern Road	Lot 1, D.P.616947	Cemetery	L
925-935 Old Northern Road	Lot 2, D.P.618271	House	L
937 Old Northern Road	Lot 1, D.P.618271	Former Uniting Church	L
965 Old Northern Road	Lot 1, D.P.589402	St Judes Anglican Church and grounds	R
1169-1171 Old Northern Road	Lot 6, D.P.239758	"Trees"	L
1355 Old Northern Road	Lot 1, D.P.615183	House	L

Galston			
37 Arcadia Road	Lot 1, D.P.632865	Galston Community Centre	L
38-50X Arcadia Road	Lot 1, D.P.558731 and Lot 14, D.P.975148	Fagan Park group, including Netherby, farm buildings, packing shed, brick kiln site, clay pit and bushland	R
39-45 Arcadia Road	Lot 10, D.P.717345	Galston Public School - original building, former teacher's residence and grounds (excluding other buildings)	L
69 Arcadia Road	Lot 14, D.P.577251	"Geelans House"	L
70 Arcadia Road	Lot 3, D.P.574791	House	L
79 Arcadia Road	Lot 1, D.P.565107	"Dumbrell House"	L
138 Arcadia Road	Lot 1, D.P.598637	Grounds - St Columbus Church	L
Bayfield Road	Road Reserve	Windbreak	L
Crosslands Road	Roadworks	Roadworks	L
29 Crosslands Road	Lot 1, D.P.581060	Windbreak	L
54 Crosslands Road	Lot 18, D.P.1056	Fruit trees	L
3 Crusader Road	Lot C, D.P.412743	House	L
Galston Road	Road Reserve	Galston Gorge sandstone buttressing	L
Galston Road	Road Reserve	Galston Gorge culvert	L
Galston Road	Road Reserve	Galston Gorge water troughs	L
295 Galston Road	Lot 64, D.P.774512	House	L
357 Galston Road	Pt. Lot B, D.P.338659	Galston Branch Library - former Church.	L
403 Galston Road	Lot 1, D.P.591136	Galston High School - "Waddell Cottage" and water trough (excluding grounds)	R
412X Galston Road	Lot 151, D.P.810018, Lots 197 and 216, D.P.752048	Galston Park and memorial	L
Galston Road	Road Reserve	Windbreak	L
24 John Road	Lot 201, D.P.594075	"Linden"	L
4 Mid-Dural Road	Lot 1, D.P.789383	House	L
10 Mid-Dural Road	Lot 4, D.P.789383	House	L
3-5 Sallaway Road	Lot A D.P.441669	Stone house	L
Sallaway Road	Road Reserve	Culvert	L
Sallaway Road		Banksia cottage quarry	L

Glenhaven 599-601 Old Northern Road Old Northern Road	Pt. Lot E, D.P.412836 Road Reserve	Roadside trees Roadside trees	L L
<hr/>			
Glenorie 1313-1317 Old Northern Road	Lot 7, D.P.13439	House	L
1409 Old Northern Road	Lot 5, D.P.752014	Glenorie Memorial Hall (Mission Hall)	L
1475 Old Northern Roád	Lot 1, D.P.212137	House	L
1477 Old Northern Road	Pt. Lot A, D.P.344063	Former Church	L
1523 Old Northern Road	Lot 2, D.P.570784	"The Manor"	L
1729 Old Northern Road	Lot 94, D.P.752014	War memorial precinct	L
1847 Old Northern Road	Lots 64 and 65, D.P.752014	House	L
<hr/>			
Middle Dural Middle Dural Road	Pt Lot 90, D.P.752048	Bushland reserve	L
1229 Old Northern Road	Lot A, D.P.154144	"Mountain View"	L
1231 Old Northern Road	Lot 5, D.P.250524	"Spring Hill" and garden	L
Old Northern Road		Windbreak south of Coppabella Road	L
<hr/>			
Wiseman's Ferry Old Northern Road	Road Reserve	Road, stone wall, escarpment and drain	R
River Road	Lot 1, D.P.733879	Wiseman's Ferry Inn, grounds	R
River Road	Waterway	Cable ferry	L
Singleton Road	Lot 40, D.P.752029	Fords Farm	L
Singleton Road	Lot 26, D.P.59266	Mill Creek Mill ruins	L
Singleton Road	Ms.1526 Sy. G.G. 22/8/1900	Wiseman's Ferry Cemetery	S
Singleton Road	Lots 15 and 44, D.P.752029, Lot 17, D.P. 752029	Singleton's Mill	S
Singleton Road	Lot 8, D.P. 752029	House ruins	L
Singleton Road	Lot 50, D.P.752029	Chimney	L
Singleton Road	Lot 301, D.P.629539	The Lodge	L
<hr/>			
Regional Reserves Berowra Valley Bushland Park		Bushland, including the former Elouera Bushland Reserve	S
Marramurra National Park		Bushland	S

APPENDIX E

Rare and threatened flora species

Species	Form
<i>Acacia bynoeana</i>	Shrub
<i>Ancistrachne maidenii</i>	Flower
<i>Asterolasia elegans</i>	Shrub
<i>Darwinia biflora</i>	Shrub
<i>Darwinia peduncularis</i>	Shrub
<i>Eucalyptus camfeldii</i>	Tree
<i>Eucalyptus leuehmanniana</i>	Tree
<i>Haloragis exalata</i>	Herb
<i>Kunzea rupestris</i>	Shrub
<i>Lasiopetalum joyceae</i>	Shrub
<i>Lepospermum deanei</i>	Shrub
<i>Lomandra brevis</i>	Perennial
<i>Lomandia fluviotilis</i>	Perennial
<i>Micromyrids blakelyi</i>	Shrub
<i>Melaluca deanei</i>	Shrub
<i>Olearia cordata</i>	Shrub
<i>Platysace clelandii</i>	Shrub
<i>Tetratheca glandulosa</i>	Shrub
<i>Genoplasium baveri</i>	Herb
<i>Haloragodendron lucosli</i>	Herb
<i>Deyeuxia appressa</i>	Spikelet
<i>Boroncia fraseri</i>	Shrub
<i>Calandenia lesselii</i>	Herb
<i>Persoonia nutans</i>	Shrub

APPENDIX F
WETLAND SURVEY



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HAWKESBURY WETLANDS REVIEW

WISEMANS FERRY TO PUMPKIN POINT

Peter Smith and Judy Smith

June 1995

Introduction

Hornsby Shire Council is completing a Rural Lands Study which is reviewing the planning controls for the area between Glenhaven, Wisemans Ferry and Berowra Creek. As part of this study, we have been engaged by Council to assess the significance and map the boundaries of wetland areas along the southern side of the Hawkesbury River between Wisemans Ferry and Pumpkin Point. In particular, we have been engaged to review differences in wetland mapping between Hornsby Shire Local Environmental Plan 1994 (LEP 1994) and Sydney Regional Environmental Plan No. 20, Hawkesbury-Nepean River, Amendment No. 2, 1994 (SREP 20). The mapping in the latter plan was based on a study that we carried out for the Department of Planning in 1992-93 (P. Smith and J. Smith, 1994, *Significant Wetlands of the Hawkesbury-Nepean River Valley*, Department of Planning, Sydney).

We reviewed the wetland boundaries by air photo interpretation, using Council's Qascophoto 1:16 000 colour air photos taken in December 1991 and January 1992 (our original mapping for SREP 20 was based on air photos taken in 1986). Discrepancies in wetland boundaries and queries on wetland significance were checked by field inspection on 15th June 1995.

The boundaries of the significant wetland areas were mapped on standard 1:25 000 topographic maps (Lower Portland and Gunderman sheets). The maps also indicate where the boundaries differ from the SREP 20 boundaries, and the boundaries of locally significant wetlands. Locally significant wetlands warrant Environmental Protection A (wetland) zoning, but not inclusion in SREP 20.

The wetland areas are discussed individually below, in sequence from Wisemans Ferry to Pumpkin Point.

SREP Wetland 76

A disturbed but still regionally significant area of mangroves, she-oak (*Casuarina glauca*) forest and reedbeds (*Phragmites australis*). The area mapped in SREP 20 does not include the full extent of reedbeds in the area. We recommend that the boundary be extended northwards as shown on the accompanying map.

Site A

Mapped as wetland in LEP 1994 but not SREP 20. A small, disturbed area of dense herb swamp. Locally but not regionally significant. We recommend retention of the Environmental Protection zoning, but the actual wetland area is much smaller than that shown on LEP 1994.

Site B

This site would have been a natural wetland originally, probably she-oak (*Casuarina glauca*)/paperbark (*Melaleuca ericifolia*) swamp forest/scrub. However, it has been grossly altered by clearing, drainage and damming. It is now pastureland with artificially created dams. One large dam on the eastern side does have value for waterbirds but, because of its artificial origin, it doesn't qualify for mapping as a natural wetland of regional or local significance.

Site C

This site would originally have been wetland, but has been completely cleared and drained.

SREP Wetland 60

A regionally significant area of mangroves. One section of the area mapped in SREP 20, which was formerly native reeds (*Phragmites australis*), has been cleared of the reeds and no longer warrants inclusion. We recommend deletion of this part of the wetland from SREP 20 (see accompanying map).

SREP Wetland 58

A large, regionally significant wetland consisting of mangroves, she-oak forest, paperbark scrub and reedbeds. Some changes are necessary to the mapped boundaries in SREP 20. An area on the eastern side of Singleton Road, which had been cleared, is now regenerating well and the vegetation is dominated by native wetland plants (*Phragmites australis* and *Melaleuca ericifolia*). We recommend that this section be added to the SREP 20 boundaries. On the western side of Singleton Road, a large drainage channel has been dug and there has been extensive recent clearing of the vegetation (including clearing since the January 1992 photos). Most of the wetland vegetation on this side of the road has been lost. The altered boundaries of the wetland are shown on the accompanying map.

SREP Wetland 56

A regionally significant area of mangroves, she-oak forest, paperbark scrub and reedbeds. Boundaries confirmed as shown in SREP 20.

SREP Wetland 54

A large, regionally significant wetland consisting of she-oak forest, paperbark scrub, saltmarsh, mangroves and reedbeds. We recommend the addition of three areas to the SREP 20 boundaries, as shown on the accompanying map. These areas have been cleared and partially drained in the past, but are now regenerating well, their vegetation consisting of native saltmarsh species (*Juncus kraussii*, *Sporobolus virginicus* and *Sarcocornia quinqueflora*) and young she-oaks (*Casuarina glauca*).

SREP Wetland 52

A large, regionally significant wetland consisting of mangroves, she-oak forest and saltmarsh. Boundaries confirmed as shown in SREP 20.

SREP Wetland 51

A regionally significant wetland consisting mainly of mangroves, with some saltmarsh. Boundaries confirmed as shown in SREP 20.

SREP Wetland 48

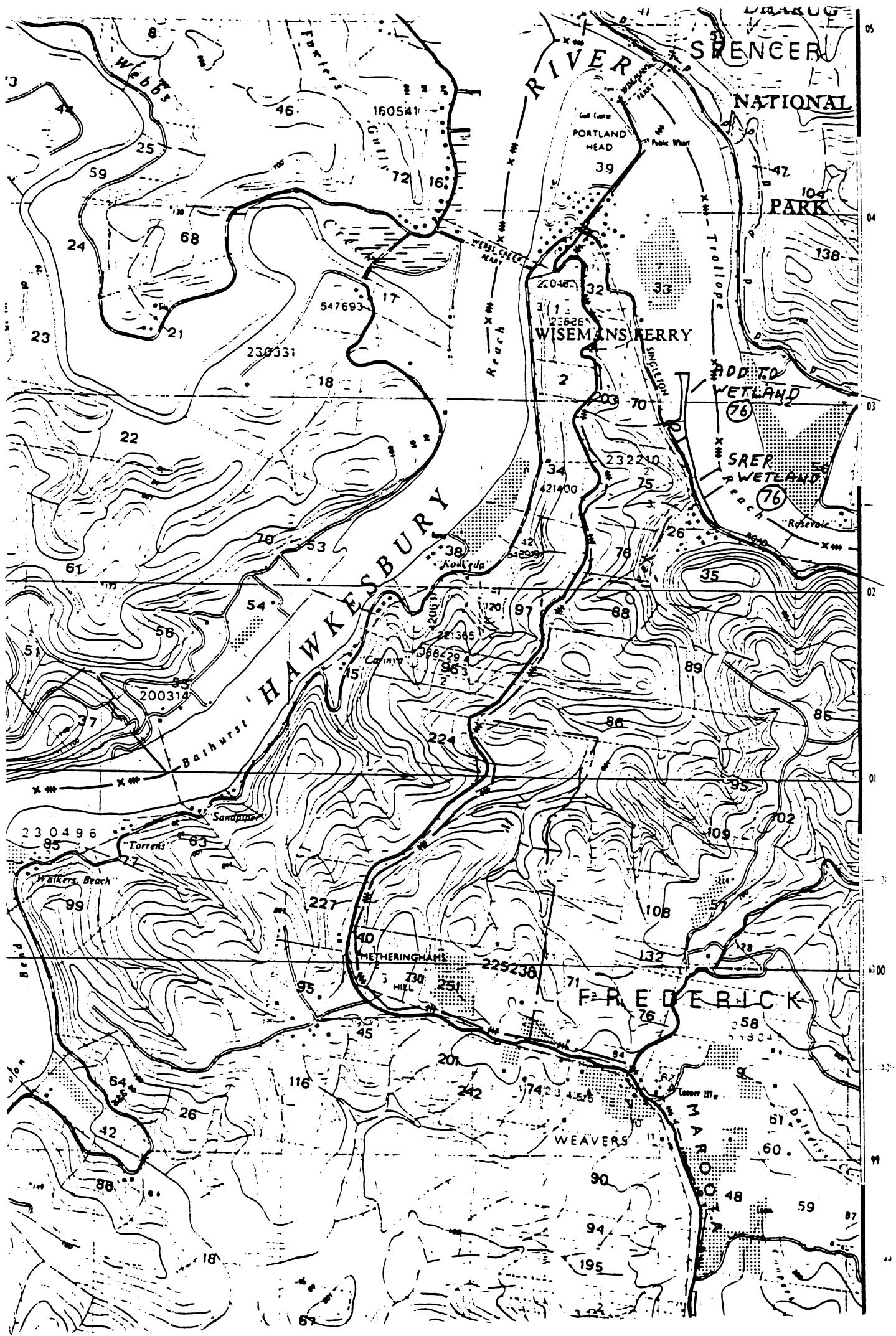
A very large, regionally significant area of mangroves, saltmarsh, she-oak forest and paperbark scrub. Boundaries confirmed as shown in SREP 20.

SREP Wetland 34

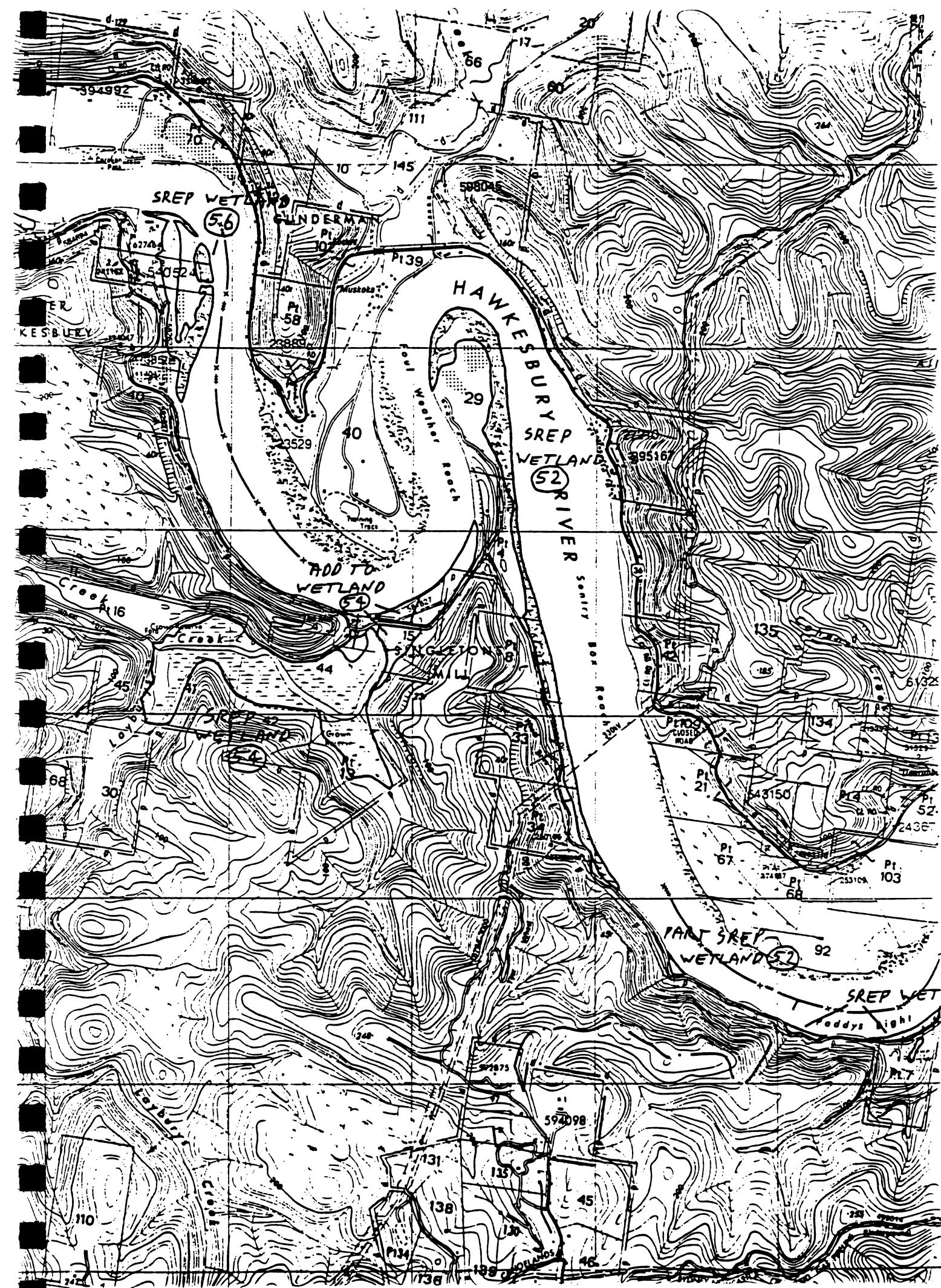
A very large, regionally significant wetland consisting chiefly of mangroves, with some she-oak forest and saltmarsh. Boundaries confirmed as shown in SREP 20.

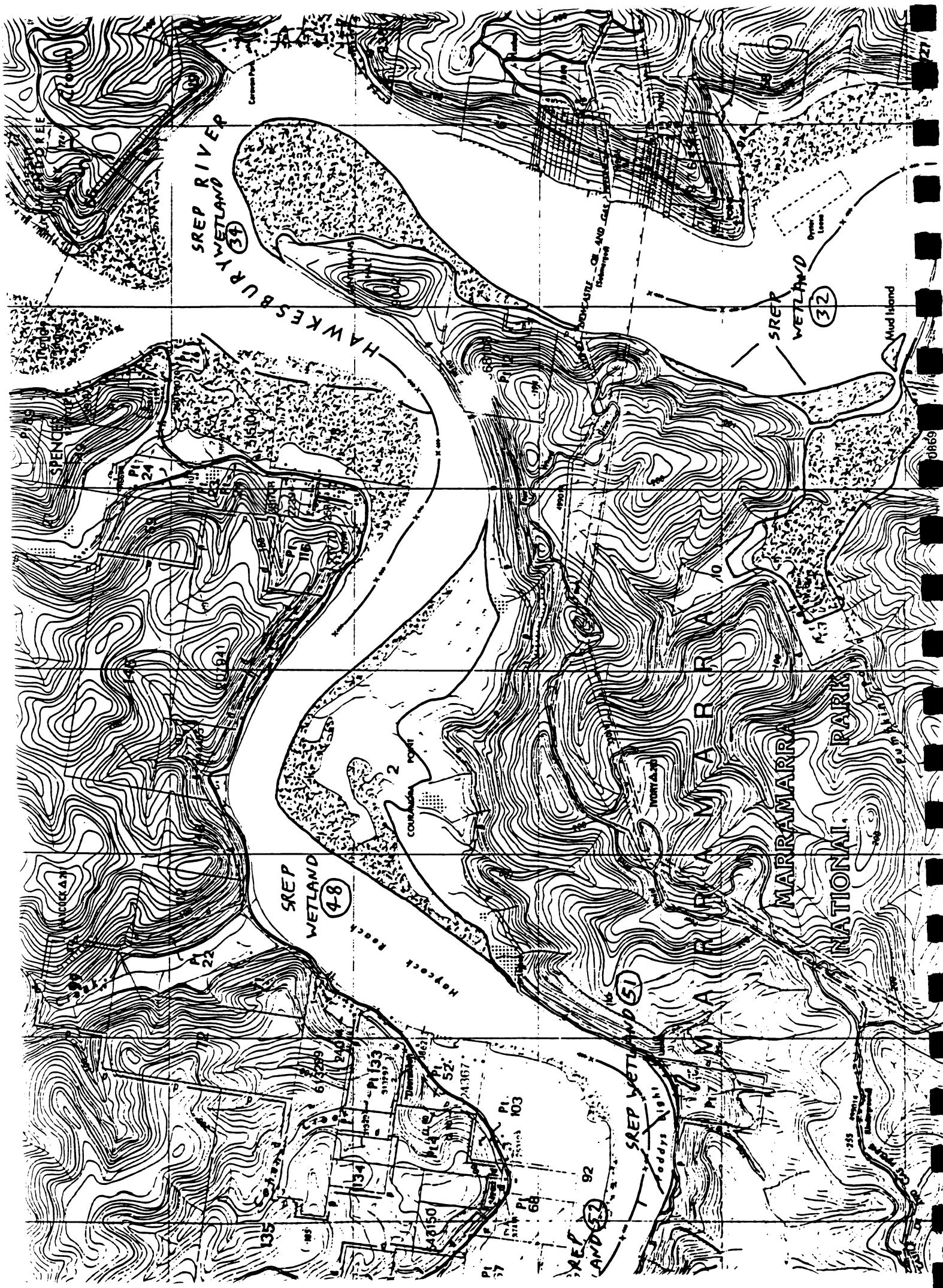
SREP Wetland 32

Another very large, regionally significant area of mangroves, with some she-oak forest and saltmarsh. Boundaries confirmed as shown in SREP 20.









APPENDIX G

AGRICULTURAL PRODUCTION IN HORNSBY SHIRE 1992-93

	Hornsby			Sydney			% Ha kg		
	No. prop	Ha	kg	No. prop	Ha	kg	No. prop	Ha	kg
Total area	124	1100		1474	80373.5		8.41	1.37	
Crops and pastures	111	462.2		984	7562.2		11.28	6.11	
Nurseries	39	92.3		248	525		15.73	17.58	
Cut flowers	28	55.2		147	323.3		19.05	17.07	
Total vegetables	29	78.5	971.8	306	1834.7	42577	9.48	2.28	2.28
Orchard trees	37	232.9		297	2571.5		12.46	9.06	
Horticultural crops	110	461.1		325	2714.2		33.85	16.99	
Vegetables									
Artichokes - globe	2	1.3	5600	3	1.8	4904000	66.67	72.22	0.11
Beans	3	1.9	2680	23	15.2	30765	13.04	12.50	8.71
Beetroot	3	1.1	4600	13	8.7	131500	23.08	12.64	3.50
Broccoli	3	1	8580	43	118.7	571925	6.98	0.84	1.50
Cabbage	2	5.5	130000	82	227	6820500	2.44	2.42	1.91
Chinese cabbage	1	2	8000	6	9.7	344000	16.67	20.62	2.33
Capsicums, chillies, peppers	7	3.7	24600	43	28.2	213980	16.28	13.12	11.50
Carrots	1	0.5	2000	14	57.8	869000	7.14	0.87	0.23
Cauliflowers	2	7.7	121000	68	201	3631500	2.94	3.83	3.33
Cucumbers	4	3.7	20200	46	44.7	394600	8.70	8.28	5.12
Leeks	2	1.3	5400	8	7.9	115200	25.00	16.46	4.69
Lettuces	4	13	166900	70	230.4	2895000	5.71	5.64	5.77
Marrows, squashes	1	0.5	1000	6	4.1	15080	16.67	12.20	6.63
Zucchini	1	0.1	2000	56	59.1	364083	1.79	0.17	0.55
Mushrooms	1		91968	40	46	8543865	2.50	0.00	1.08
Spring onions	2	1.5	3120	16	17.1	870230	12.50	8.77	0.36
Parsley	4	1.9	18800	23	24.8	1017207	17.39	7.66	1.85
Peas	2	0.7	2500	8	8.2	13350	25.00	8.54	18.73
Snow peas	3	2	3775	11	5.8	25695	27.27	34.48	14.69
Pumpkins	2	3.3	12000	42	101.2	724500	4.76	3.26	1.66
Raddishs	1	1	3200	12	20.3	839980	8.33	4.93	0.38
Rhubarb	1	1	13636	3	5.2	44580	33.33	19.23	30.59
Silver beet & spinach	2	2.2	26960	39	31.9	484178	5.13	6.90	5.57
Tomatoes	16	18.9	289.7	80	138.4	2631.1	20.00	13.66	11.01
Strawberries	3	2.2	13600	17	26.6	147000	17.65	8.27	9.25
	Hornsby			Sydney			% Ha No. trees		
	No. prop	No. trees	kg	No. prop	No. trees	kg	No. prop	Ha	No. trees
Orchard									
Navel oranges	3	1130	59000	127	196782	6619432	2.36	0.57	0.89
Valencia oranges	2	995	80200	116	163437	5209461	1.72	0.61	1.54
Oranges	4	2125	139200	140	367307	11936193	2.86	0.58	1.17
Grapefruit	1	20	2000	12	2040	25890	8.33	0.98	7.72
Lemon & lime	4	1095	32345	79	351716	2020231	5.06	0.31	1.60
Mandarins	2	892	16370	40	24171	407487	5.00	3.69	4.02
Citrus total	6	4132	189915	155	745834	14405281	3.87	0.55	1.32
Loquat	1	40		3	410	2500	33.33	9.76	0.00
Nectarines	27	29283	664938	119	85479	1318719	22.69	34.26	50.42
Peaches	31	31428	753941	137	148226	2372481.5	22.63	21.20	31.78
Persimmons	2	183	4500	17	4447	111660	11.76	4.12	4.03
Plum	23	7222	236742	111	40531	723195	20.72	17.82	32.74
Prune	1	80	2442	2	1230	63942	50.00	6.50	3.82
Almond	1	24	200	1	24	200	100.00	100.00	100.00
	Hornsby			Sydney			% No. kg		
	No. prop	No.	kg	No. prop	No.	kg	No. prop	No.	kg
Stock									
Sheep shorn	1	10	20	20	8655	41081	5.00	0.12	0.05
Meat cattle -total number	4	69		360	26837		1.11	0.26	
Pigs - total number	1	15		46	51925		2.17	0.03	
Horses - stud	6	100		22	718		27.27	13.93	
Horses - total	8	115		204	3854		3.92	2.98	
Live meat strain chickens	4	1009224		173	62631375		2.31	1.61	
Live ducks - on holding	1	18000		10	155141		10.00	11.60	
Live ducks - disposed of	1	10500		11	1048150		9.09	1.00	
Geese, game birds	1	900000		5	1308180		20.00	68.80	
Dressed poultry	1	450000		5	690256		20.00	65.19	
Eggs for human consumption	2	14680	dz	89	29605363	dz	2.25	0.05	

(Source: ABS, 1993)

APPENDIX H

AGRICULTURAL PRODUCTION SURVEY HORNSBY SHIRE

SUMMARY

A survey of agricultural production in Hornsby Shire was carried out by NSW Agriculture as part of a Rural Land Study undertaken by Hornsby Shire Council.

The survey revealed that agricultural production in the Shire has been dramatically underestimated. Although ABS statistics for 1992-93 placed the total value of agricultural production in Hornsby and Kur-ring-gai at only \$18m, NSW Agriculture now estimates a gross value for 1994-95 approaching \$100m*.

The major components of the Department's estimate are: vegetable production, \$6.7m; fruit production \$10m; flower production \$24.9m; poultry \$5.4m; and the wholesale nursery industry, \$46m - \$50m. The following report sets out how these estimates were made.

Taken with the contribution made by agriculture to scenic and environmental values, these findings have important implications for planning in the shire.

*The Department's estimate does not include the value of the recreational horse industry, the horse racing industry, or the retail nursery industry to the Shire.

CONTENTS

1. OBJECTIVES

- 1.1 Hornsby Rural Lands Study**
- 1.2 The Committee**
- 1.3 The Study Area**
- 1.4 The Agricultural Survey**

2. METHODS

- 2.1 Resources**
- 2.2 Field Work**

3. RESULTS

- 3.1 Plant Industries**
 - 3.1.1 Vegetables**
 - 3.1.2 Fruit**
 - 3.1.3 Flowers**
 - 3.1.4 Nurseries**
- 3.2 Animal Industries**
 - 3.2.1 Poultry**
 - 3.2.2 Pigs**
 - 3.2.3 Cattle**
 - 3.2.4 Bees**

1. OBJECTIVES

1.1 Introduction, Hornsby Rural Lands Study

On the 17th February, 1993, Hornsby Shire Council resolved to carry out a review of its rural areas as part of its ongoing strategic planning program. This area had not been the subject of a major review for at least 10 years.

1.2 The Committee

The Council established a technical steering committee made up of Councillors and Council Officers, together with representatives of the Department of Planning, NSW Agriculture, the Environmental Protection Authority and the National Parks and Wildlife Service.

Recognising the need for effective community liaison, the Council also established a subcommittee of approximately 30 representatives of industry and community groups.

1.3 The Study Area

The selection of the study area was based on the current rural zones of the Shire. The area extends from a line between Dural and Glenhaven north to Wisemans's Ferry. This area of some 306 square kilometres represents 60% of the whole Shire but also includes the Marramarra National Park covering 115 square kilometres which was not the subject of the survey.

1.4 The Agricultural Survey

The Committee requested NSW Agriculture to carry out an agricultural survey as part of the rural land study. The agricultural survey was confined to an assessment of the gross value of agricultural production.

No attempt was made to assess the profitability of any enterprise or industry.

2. METHODS

2.1 Resources

Specialist advisory officers of NSW Agriculture with knowledge of the area took part in the assessment. They included three horticulturists specialising in cut flowers, vegetables and fruit, respectively; the district agronomist; the regional poultry officer; and the agricultural environment officer. Hornsby planning staff were fully involved in the survey and supplied survey vehicles and cartographic resources.

Prior to field work, all staff met to discuss survey methods and estimates of production. It was agreed that the survey would be restricted to estimates of the gross value of production and that the basis for the estimates would be set out in the survey report. It was also agreed that where there was doubt, the survey would be deliberately conservative.

2.2 Field Work

Field surveys were carried out for flowers, fruit and vegetables on the July 8th and 26th August, 1994. A network of local roads was selected which gave a thorough coverage of the agricultural parts of the Shire. The network was arranged wherever possible to form a grid.

A survey vehicle was then driven slowly along these roads as the advisory officers made their observations. Observations were made for short stretches, the vehicle stopped and the information recorded at regular intervals directly on the survey map.

Following the survey, observations for the cells of the grid, that is, the discrete areas surrounded by roads, were totalled and recorded on the map (Map 1).

Field surveys for poultry and agronomy were conducted separately.

Other industries were not estimated by field survey.

Hornsby Shire Council provided vehicles and drivers for the fruit, flower and vegetable survey. The Department provided vehicles for other work.

3. RATIONALE AND RESULTS

3.1 Plant Industries

3.1.1 Vegetables

In Hornsby Shire, the most common vegetables grown are typical market garden crops such as silver beet, rhubarb, snow peas, tomatoes, lebanese cucumbers, broccoli, shallots, and lettuce (both hydroponic fancy and crisp head).

The estimate of the value of vegetable production was based on the following reference material:

- i) The recognised industry standard for Vegetable Gross Margin analysis developed by Murison and Davies, NSW Agriculture;
- ii) Current weighted monthly average prices for specific vegetable crops generated by Flemington Market Reporting Service, NSW Agriculture; and
- iii) Average vegetable yields for specific vegetable crops in NSW, including the Sydney basin, produced by NSW Agriculture.

For each farm, the following assumptions were made:

- i) Depending upon the specific field crop grown, 3 to 4 sequential crops could be grown in the prepared land each year.
- ii) Depending upon the specific crop grown, 2 to 3 sequential crops could be grown inside poly/greenhouse each year.

The area of each crop was estimated. Average crop yields for each crop were then ascertained from Murison's Vegetable gross margins and/or published documentation from NSW Agriculture.

The average crop yield was multiplied by the area of land to give an average yield for the unit of land being assessed. The average yield per unit of land was then multiplied by the current weighted monthly average price for the crop. This figure was then multiplied by the number of crops (taking summer v's winter yields into consideration), estimated to be grown in the

district annually. In this way a farm-gate value was ascertained for each crop assessed.

The results of this survey are shown on the map (Map 1). The gross value of vegetable production in Hornsby Shire was estimated to be \$6.702m.

3.1.2 Fruit

3.1.2.1 Stone fruit

Typically, most of the stone fruit in the district are low to medium chill varieties of peaches and nectarines which mature before Christmas. Yields usually vary (for mature trees) between 3,000-6,000 trays per hectare. For the last couple of seasons, an average price of about \$8.00 per tray (ranging between \$6.00 - \$16.00) has been received.

If an average yield of 4,000 trays per hectare at an typical price of \$8.00 a tray is chosen, then the Gross Income would be 4,000 (trays) x \$8.00 (per tray) = \$32,000/ha.

3.1.2.2 Kiwi fruit

Typically yields of 3,000 - 5,000 trays of fruit per hectare can be anticipated with yields in some instances getting as high as 10,000 trays per hectare.

At an average price of about \$5.00 a tray (equivalent) and at a typical yield of 4000 trays per hectare then the Gross Income would be about \$20,000/hectare.

3.1.2.3 Citrus

With typical yields of about 20 tonnes/hectare and prices, (depending on the season and fruit quality) typically ranging between \$100 - \$200/tonne, then the Gross Margin would be expected to range between \$2,000 - \$4,000 per hectare.

The results of the survey are shown on the map (Map 1.) The gross value for all varieties of fruit production for the Shire was estimated to be \$10.077m.

3.1.3 Flowers

Cut flowers are a highly perishable commodity. Few flower types can be stored - most are picked and sold within 1 to 2 days. This means that growers are very vulnerable to outside factors beyond their control. For instance, a spell of hot weather can advance flowering, so that a target market opportunity (eg Valentine's Day) is missed, or it may reduce sales as consumers (at both the wholesale and retail levels) are wary of purchasing their usual amounts of flowers.

The value of flower crops can be influenced by a number of factors. These can include crop health and vigour at time of harvest (factors which could lower the value include pests, diseases, nutritional problems, irrigation efficiency) and market factors (volume of equivalent quality lines offered in the marketplace, market outlets, grower reputation etc.)

At the time of the survey, winter crops were flowering and spring-flowering crops were growing. Some crops seen were perennial, such as roses and proteas, so that following maturity, the crop can be picked for a number of years. Others like carnations are picked for 18 months to two years, and then replanted. Annual crops like stock are harvested every 4 - 5 months so that up to three crops per annum can be grown in the same area of ground.

Where a crop was badly weed infested or a greenhouse was not adequately maintained, the potential value of production was rated as nil or given a low value. Some farms had areas unplanted - these could either have been left fallow between successive crops, or were in fact not being used for production.

Orchids were not included in the figures. Many growers move between producing plants for sale (nursery crops) and cut flowers, depending on demand, and it is a fragmented sub-industry.

The values shown in Table 1 are based on discussions held with a large grower in the Hills district and with a group of six growers who produce a wide range of greenhouse and field crops in the greater Sydney area.

Farm areas were estimated in hectares for large areas and in square metres for smaller plots or greenhouse crops. The values shown in Table 1 were then used to calculate the potential annual farm gate value of the crops.

Table 1. Value of flower crops by area.

Crop	Annual value per square metre of production	Annual value per hectare of production
field flowers - top quality		
-	\$20.00	\$200,000
average quality/bulbs		
	\$10.00	\$100,000
poor quality		
	\$ 5.00	\$ 50,000
Greenhouse crops - top quality/out of season		
- average quality	\$40.00	\$400,000
- poor quality	\$30.00	\$300,000
- roses	\$20.00	\$200,000
	\$60.00	\$600,000
Proteas		\$ 12,000
Foliage crops, eg eucalyptus, cypresses	\$10,000	\$100,000

The results of the survey are shown on the map (Map 1). The total gross value for cut flower production in Hornsby Shire was estimated to be \$24.955m.

3.1.4 Nurseries

No statistics are available on the gross value of production of the wholesale nursery industry in the Shire. As a result of its variety and seasonality, the industry is not amenable to ground survey techniques.

Two rough approximations of the gross value were therefore attempted. The first was based on the national nursery levy; the second was based on an assessment of registered nurseries within the Shire. Both assessments were made in consultation with the Nursery Industry Association of NSW.

Retail nurseries were not assessed.

3.1.4.1 The nursery levy

The Horticultural Research and Development Corporation is supported by a pot levy on nurseries. The collection is made by the pot manufacturers at point of invoice and applies to all containers.

Last year the levy was 2.5 cents per container (it is now 5 cents) and it provided \$600 000 nationally. As this represents 2.5% of all the containers sold to nurseries, the total value of pots sold in Australia each year is about \$24m.

As a first assumption, but based on manufacturers opinion, a 140 mm pot may be taken as the industry average of a range of pot sizes. As this size sells for about 15 cents to the trade, it follows that there are about 160 million pots sold in Australia each year.

As a second assumption, the average price of a nursery plant in a 140 mm pot may be taken to be \$3.50. It then follows that the annual gross value of production of the nursery industry in Australia is approximately \$560m.

Based on figures supplied by the Australian Bureau of Statistics, New South Wales supplies about one third of the national total. Thus, on the basis of the previous calculation, the industry in New South Wales has a gross value of production of about \$187m.

As a third assumption, but based on industry opinion, Sydney is thought to provide approximately half the State total, some \$93m.

As a final assumption, again based on industry opinion, Hornsby is thought to provide approximately half the metropolitan total. Therefore, using this approach, the gross value of production of the nursery industry in Hornsby is estimated to be about \$46m per year.

3.1.4.2 Registered nurseries

The NSW Horticultural Stock and Nurseries Act, 1969, requires the registration of nurserymen in New South Wales. From that register, a list was obtained of all registered nurseries in Hornsby Shire.

The second estimate of the annual gross value of production of nurseries in Hornsby Shire was based on the following interpretation of that list.

The list revealed a total of 102 registered names in Hornsby. Of these, at least 11 were determined to be double registrations of the same company for trading purposes or registrations of nurseries with little wholesale production.

It was recognised that the remaining 91 names may include some further duplications or the names of nurseries with little wholesale output. Despite the provisions of the Act, there may also be nurseries in Hornsby which are not included on the list.

For the purpose of this estimate, the 91 remaining nurseries were accepted as the total number in the Shire. Of these, 57 were located within the study area and 34 were located in Hornsby Shire but outside the study area.

Officers of the Nursery Industry Association have direct knowledge of 29 of these nurseries. To protect individual confidentiality, they estimated their combined total gross value of production to be approximately \$16m.

Of the remaining nurseries, some are likely to be more substantial than those known to the Association, while others were likely to be less productive. Although the more active nurseries are more likely to be known to the Association, both groups are believed to be generally representative of the industry.

Therefore, using this approach by extrapolation $[(16/29) \times 91]$, the nursery industry in Hornsby Shire is estimated to have an annual gross value of production of some \$50m.

Both estimates for the nursery industry, presented above, are in general agreement. However, they should be taken as indicative only. There is clearly scope for a more thorough evaluation of this important sector.

3.2 Animal Industries

3.2.1 Poultry

Poultry farming in the Hornsby Shire has declined. Poultry meat production (chicken, quail and duck) now dominates with seven farms: only three egg/pullet enterprises are left.

While the substantial downturn in profitability of egg production is currently (and over the past two years) causing negative returns for these two or three small enterprises, this cannot be blamed for the overall demise of egg production activity in the Hornsby Shire. Increasing land prices due to rural residential activity over the past 12 or more years has made it difficult for all types of poultry farmers to justify investment in this Shire due to the likely short life of such investments. An exception to this trend is the Fiddletown area, principally Peebles and Bloodwood Roads on the Northern fringe, adjacent to Mirramarr National Park.

Although poultry production was assessed by visiting each farm in the area, the anonymity of each farm was preserved. Profitability was not assessed, only the gross value of production.

In the valuations following, the substantial production of the two poultry processing plants in Crosslands Road Galston has not been included.

3.2.1.1 Quail Meat

Farm 1. This farm has a shed capacity of 60,000 square feet which, at an estimated cost of \$10 per sq ft = \$600,000 investment in infrastructure.

With 6.5 batches of quail per year @ 230,000 birds/batch, some 1.5m birds are produced. A value of \$0.65 per bird provides a gross value of production of \$975,000 per annum.

Farm 2. This enterprise is converting from chicken meat to quail in May, 1995, when it will have an area of 45,300 square feet produce approximately 1.13m birds with a gross value of production of \$734,500. For the current survey, this enterprise is assessed as a chicken meat enterprise (below).

Farm 3. This enterprise produces quail meat and day old quail for growing elsewhere in the Shire. For this estimate the value of production of day old quail is included in the other quail enterprises listed above.

The additional quail meat production at this farm is relatively small and adds about 10% to the Shire total. The enterprise also processes quail on site and the value of this component of the business has not been assessed.

Thus the estimate for total gross value for quail meat in the Shire is \$1.07m (\$0.975m x 10%).

This is expected to rise to \$1.88m in 1995.

3.2.1.2 Meat chickens

Farm 1. This farm has a shed capacity of 27,300 square feet. Using a value of \$6 per square foot provides an infrastructure cost of some \$163,800.

Estimating 5 batches chickens per annum with 40,000 birds in each batch yields 200,000 birds. Assuming an average bird weight of 2.2 kg and a price of \$1.46/kg this provides a gross value of production of \$642,000.

Farm 2. This farm has 42,400sq ft total shed capacity @ \$10/sq ft = \$424,000 infrastructure value.

Estimating 5.5 batches p.a. @ 60,000/batch = 330,000 birds with a gross value of production of \$1.156m.

Farm 3. This farm has 45,300 sq ft total shed capacity @ \$10/sq ft = \$453,000 infrastructure value.

Estimating 5.4 batches p.a. @ 64,000 birds/batch = 345,600 birds with a gross value of production of \$1.11m.

This farm will change to quail production in May, 1995 (see above).

Farm 4. -This farm has 31,416 sq ft total shed capacity @ \$10 sq ft = \$314,160 infrastructure value.

Estimating 5 batches per annum with 45,000 birds/batch = 225,000 birds with a gross value of production of \$722,700.

Thus the total gross value of chicken meat in the Shire is estimated to be \$3.63m.

3.1.2.3 Duck meat

There is one duck meat enterprise in the Shire with a floor shed area of 28,800 square feet which, at \$10 per square foot provides an infrastructure value of \$288,000.

Estimating production as 120,000 birds p.a. @ \$5 each provides a gross value of production of \$0.6m.

3.2.1.3 Eggs

There are two relatively small egg producers in the Shire.

Farm 1. This houses some 6000 hens producing approximately 21 dozen eggs/hen per year which, at a price of \$1.2 per dozen would provide a gross value of annual production of \$126,000.

Farm 2. This houses 2,000 hens @ 20 dozen eggs p.a. @ \$12/dozen = \$17,000 gross value of production p.a.

Thus, egg production in the Shire has a total gross value of production of \$143,000.

3.2.1.4 Pullets

A pullet enterprise in the shire raises 1,000 pullets per year which, with a value of \$8.50 per pullet = \$8,500 per year.

From these calculations, total poultry production in the Shire is estimated to be \$5.45m.

3.2.2 Pigs

There is no significant production of pigs in the Shire.

3.2.3 Cattle

3.2.3.1 Dairy cattle

There are no operating dairies in the shire.

3.2.3.2 Beef Cattle

A field survey was undertaken to establish the number of beef cattle in the shire. Herd size was estimated only by roadside observation and not by yarding. In this way, the total population of beef cattle in the Shire was assessed as approximately 350 mature animals: almost all were female.

For each herd, it was assumed that a mature cow in average condition would be worth \$550 and would have one calf each year worth \$350 as a yearling; thus the average cow-calf unit would be worth approximately \$900 per annum. Where they were observed, mature bulls were also assigned a value of \$900. No attempt was made to assign higher values for purebred cattle.

The gross value of production for beef cattle in the Shire was therefore calculated to be \$315 000 (350×900).

3.2.4 Bees

The value of bees to the area is not only the direct value of the honey produced but also the value of pollination to the other horticultural industries.

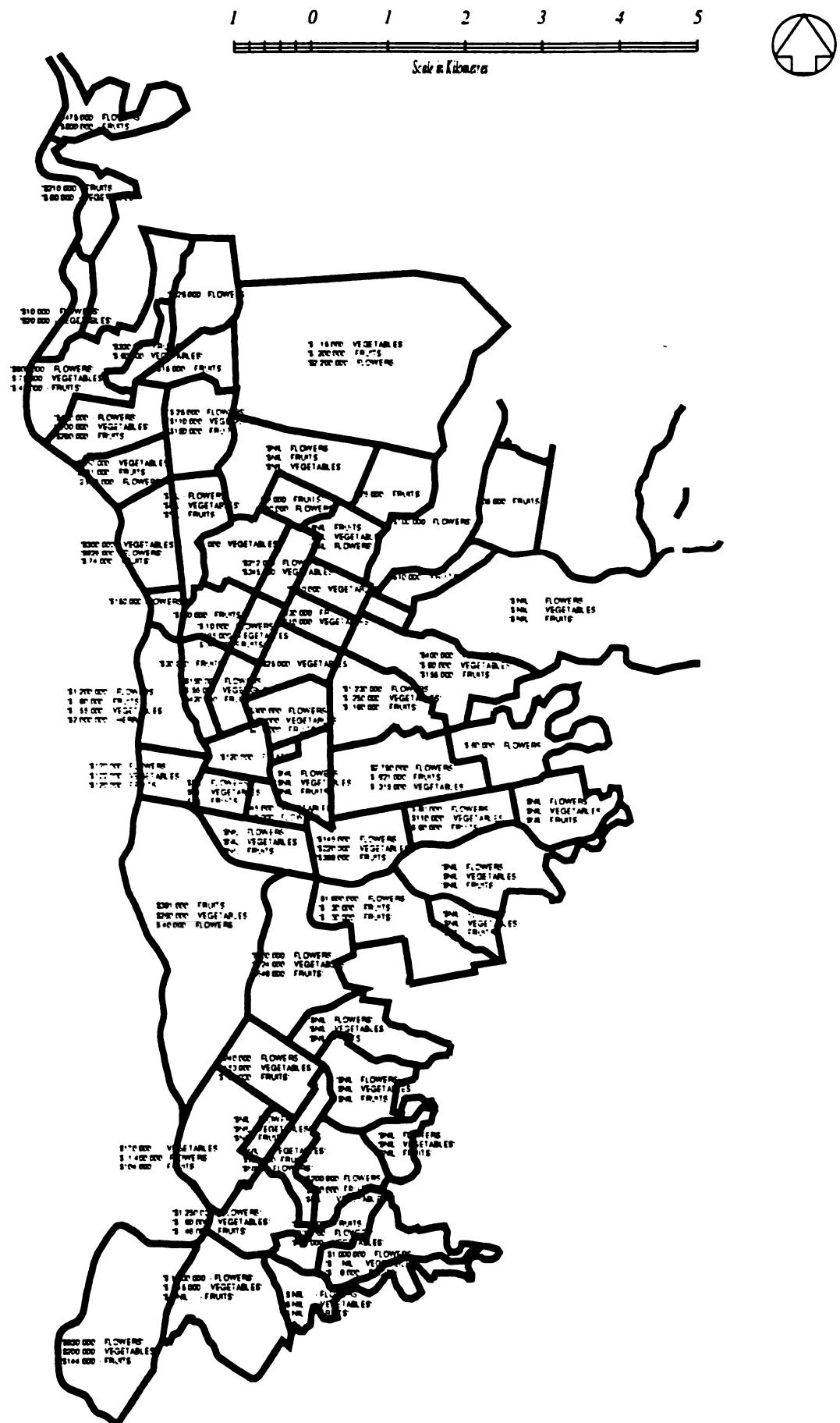
Honey production

Hive numbers

< 40	40-200	200-500	total
92	5	1	98
445	340	450	1253

1 253 hives producing 25 kg of honey = 30 875kg

3 0875kg of honey at \$1.15 = \$35 506



AGRICULTURAL PRODUCTION SOUTH



AGRICULTURAL PRODUCTION NORTH

APPENDIX I
COMMERCIAL CENTRES - LAND USE SURVEY

WISEMANS FERRY COMMERCIAL CENTRE

Map No.	Address	Level	Name	Leasable Floor Area (m2)	Floor Space Category
1	River Road	G	Wisemans Ferry Video Shop	23	5
2	River Road	G	Wisemans Ferry Inn	651	29
3	Shop 1, Wisemans Ferry Village	G	Newsagency	34	4
4	Shop 1a, Wisemans Ferry Village	G	Wisemans Ferry Real Estate	24	12
5	Shop 2, Wisemans Ferry Village	G	Newsagency	34	4
6	Shop 3, Wisemans Ferry Village	G	Wisemans Ferry Meat Mart	28	1
7	Shop 4, Wisemans Ferry Village	G	Scotts Hairdressing	28	5
8	Shop 5, Wisemans Ferry Village	G	Vacant	31	8
9	Shop 6, Wisemans Ferry Village	G	Hardware Store	26	3
10	Shop 7, Wisemans Ferry Village	G	Hardware Store	26	3
11	Shop 8, Wisemans Ferry Village	G	Vacant	27	8
12	Gen/store, Wisemans Ferry Village	G	Wisemans Welcome Mart	164	6
13	Shop 9, Wisemans Ferry Village	G	Tasty Takeaway	100	1
14	Shop 10, Wisemans Ferry Village	G	Wisemans Coffee House and Restaurant	121	38
15	Shop 11, Wisemans Ferry village	G	Arts and Craft shop	60	4
TOTAL					1377

GALSTON COMMERCIAL CENTRE

Map No.	Address	Level	Name	Leasable Floor Area (m2)	Floor Space Category
1	362 - 364 Galston Rd	G	Vacant	50	8
2	362 - 364 Galston Rd	G	Vacant	50	8
3	362 - 364 Galston Rd	G	Galston video	50	5
4	362 - 364 Galston Rd	G	St. Vincent De Paul	50	18
5	362 - 364 Galston Rd	G	Ocean Choice Seafood Takeaway	50	1
6	362 - 364 Galston Rd	I	Galston House Chinese Restaurant	206	38
7	362 - 364 Galston Rd	G	Rodney's Hairstylist	45	5
8	362 - 364 Galston Rd	G	Compass Travel	50	5
9	358 - 360 Galston Rd	I	Frederick Gordon & Associates (Life Insurance and Superannuation Planning)	62	13
10	358 - 360 Galston Rd	I	Vacant	26	17
11	358 - 360 Galston Rd	G	Australia Post	40	16
12	358 - 360 Galston Rd	G	60' Minute Dry Cleaning	40	5
13	358 - 360 Galston Rd	G	Fruit and Vegetable Shop	45	1
14	358 - 360 Galston Rd	G	Peter's Shoe Barn	45	2
15	358 - 360 Galston Rd	G	Eric's Tender Meats	45	1
16	358 - 360 Galston Rd	G	Galston Community Policing Centre	45	14
17	358 - 360 Galston Rd	G	Hairdressing Professionals	45	5
18	358 - 360 Galston Rd	G	TAB	45	5
19	358 - 360 Galston Rd	G	Movies Plus (Video Shop)	60	5
20	358 - 360 Galston Rd	G	Chemist	104	4
21	358 - 360 Galston Rd	I	Dental Surgery	34	11
22	358 - 360 Galston Rd	I	Vacant	30	17
23	358 - 360 Galston Rd	I	Conveyancing Services	54	13
24	354 - 356 Galston Rd	G	Hairdressers (at rear of newsagency)	45	5
25	354 - 356 Galston Rd	G	Newsagency	120	4
26	354 - 356 Galston Rd	G	Galston Delicatessen	75	1
27	354 - 356 Galston Rd	G	The Chemist Shop	70	4
28	350 - 352 Galston Rd	G	Lavender and Lace (Craft shop)	80	4
29	350 - 352 Galston Rd	G	Clancy's Food Store	330	6
30	350 - 352 Galston Rd	G	Galston Butchery	112	1
31	350 - 352 Galston Rd	G	Thrift Link Hardware	112	3
32	348 Galston Rd	G	National Australia Bank	180	9
33	346 Galston Rd	G	Liquorland	80	1
34	346 Galston Rd	G	Gary Collins Real Estate	70	12
35	346 Galston Rd	G	Galston Service Centre (Ampol Petrol Station)	100	19
36	346 Galston Rd	G	Windybank's Fresh Seafood	25	1

GALSTON COMMERCIAL CENTRE CONTINUED

Map No.	Address	Level	Name	Leasable Floor Area (m2)	Floor Space Category
37	346 Galston Rd	G	Essentially Beautiful Beauty Salon	25	5
38	346 Galston Rd	G	Cake Shop	100	1
39	4 - 10 Arcadia Rd	G	Galston Takeaway	125	1
40	353 Galston Rd	G	Greenshades Nursery	100	27
TOTAL				2920	

DURAL SERVICE CENTRE - BLOCK 1

Map No.	Address	Level	Name	Leasable Floor Area (m2)	Floor Space Category
1	Old Northern Rd	G	Agean Restaurant	300*	38
2	1/286 New Line Rd	G	Dural Terrace Chinese Restaurant	300	38
3	2/286 New Line Rd	G	Charlton Horseland	300	3
4	3/286 New Line Rd	G	Medical Centre	144	11
5	4/286 New Line Rd	G	Medical Centre	144	11
6	5/286 New Line Rd	G	Vacant	144	46
7	6/286 New Line Rd	G	Vacant	144	46
8	7/286 New Line Rd	G	BCP Plumbing and Bathroom Supplies (Opening soon)	144	3
9	8/286 New Line Rd	G	Belmonte Cafe	144	38
10	9/286 New Line Rd	G	Garden Potential (Dried flowers, pots)	144	4
11	10/286 New Line Rd	G	Kleenheat Gas (heaters, etc)	144	3
12	11/286 New Line Rd	G	Footwear Trading Company	144	2
13	12/286 New Line Rd	G	M & C Carpets	133	3
14	13/286 New Line Rd	G	The Stair Makers Office and Showroom	133	45
15	14/286 New Line Rd	G	Vacant	144	46
16	15/286 New Line Rd	G	Vacant	144	46
17	16/286 New Line Rd	G	Vacant	144	46
18	17/286 New Line Rd	G	Vacant	144	46
19	18/286 New Line Rd	G	Vacant	144	46
20	19/286 New Line Rd	G	Vacant	144	46
21	20/286 New Line Rd	G	Vacant	144	46
22	21/286 New Line Rd	G	Vacant	144	46
23	22/286 New Line Rd	G	Dural Motor Maintenance	144	20
24	23/286 New Line Rd	G	Vacant	133	46
25	24/286 New Line Rd	G	Weston Stationary Printing and Office Supplies	133	3
26	25/286 New Line Rd	G	New Line Automotive - Mechanical Repairs	156	20
27	26/286 New Line Rd	G	Castle Plumbing and Drainage Pty Ltd	156	13
28	27/286 New Line Rd	G	Vacant	156	46
29	28/286 New Line Rd	G	Vacant	156	46
30	29/286 New Line Rd	G	Vacant	156	46
31	30/286 New Line Rd	G	Vacant	156	46
32	31/286 New Line Rd	G	Vacant	156	46
33	32/286 New Line Rd	G	Fire Pumps Australia	156	42
34	33/286 New Line Rd	G	Vacant	156	46
35	34/286 New Line Rd	G	Vacant	156	46
36	286 New Line Rd	G	McDonalds	282	38
37	286 New Line Rd	G	KFC	236	38
TOTAL				6107	

DURAL SERVICE CENTRE - BLOCK 2

Map No.	Address	Level	Name	Site Area (ha)	Leasable Floor Area (m2)	Floor Space Category
1	282-284 New Line Rd	G	Stockman's Farm and Garden Retail	2.1	N/A	39
2	272-274 New Line Rd	G	Brushwood Prestige Fencing, Martins Soil Co. Building and Landscape Supplies, Gosford Quarries	2.0	N/A	47
3	268-270 New Line Rd	G G	Dural Automotive Car Repairs and Servicing Dural Irrigation - Watering Systems	2.2	851 712	20
4	260-266 New Line Rd	G	Dural Golf Driving Range	3.3	N/A	33
5	254 New Line Rd	G	Australia Post - Dural Delivery Centre	0.37	900	16
6	252 New Line Rd	G	Leisure Logs & The Australian Summerhouse Company	2.0	N/A	47
7	248-250 New Line Rd	G	Rob Musgrave Builder	3.2	N/A	13
8	246 New Line Rd	G	Southern Cross Laboratories	0.4	688	13
9	244 New Line Rd	G	Jarrett Implements Pty Ltd	1.9	N/A	13
10	242 New Line Rd	G	Dural Farm Machinery and Dural Mowing Service	1.9	97.5	39
11	240 New Line Rd	G	V & J Welding	0.76	178	13
12	238 New Line Rd	G	Home Timber and Hardware	2.0	3533	3
13	236A New Line Rd	G	Brooks Moylan Quarry Tiles	1.0	N/A	47
TOTAL				23.1		

APPENDIX J
VIEWERS EXPERIENCE AND LANDSCAPE CHARACTER TYPES

The viewer's experience of the area

Old Northern Road corridor

Things to discourage:

- * Industrial and commercial developments set close to the street;
- * Proliferation of signage and advertising;
- * Urban treatments of street frontages;
- * Loss of view lines and panoramas; and
- * Extractive industry sites in sensitive locations

Things to encourage:

- * Varied set backs from the street for both residential and commercial developments to encourage maintenance of site lines to the surrounding landscape;
- * Landscape treatment to soften the impact of developments and integrate them into the rural landscape;
- * Buildings of rural scale and forms which relate to the local precedents;
- * Reduction in the visual impact of signage. A policy should be developed to control the height, size, colour and placement of signs and advertising materials, consistent with the rural and scenic nature of the corridor, which still allows diversity and local character to continue; and
- * Development of viewing places in important view locations which provide interpretation of the view and safe access.

Canoelands Road Corridor

Things to discourage:

- * Extractive industry sites in sensitive locations; and
- * Loss of view lines and panoramas

Things to encourage:

- * Maintenance of site lines to the surrounding landscape;
- * Landscape treatment to soften the impact of developments and integrate them into the rural landscape;
- * Promotion of the area as a scenic location; and
- * Development of viewing places in important view locations which provide interpretation of the view and safe access.

Galston Road corridor (includes Mid-Dural Road)

Things to discourage:

- * Expansion of Galston village in the south or easterly direction;
- * Proliferation of signage and advertising;
- * Urban treatments of street frontages; and
- * Loss of view lines and panoramas

Things to encourage:

- * Maintenance of a visual buffer zone between residential areas of Galston village and Fagan Park in the Gribbenmount Road area;
- * Development of an urban design policy for the commercial centre of Galston Village which reflects its rural setting, including landscape treatment to soften the impact of developments and integrate them into the rural landscape;
- * Buildings of rural scale and form which relate to the local precedents;

- * Reduction in the visual impact of signage. A policy should be developed to control the height, size, colour and placement of signs and advertising materials, consistent with the rural and scenic nature of the corridor, which still allows diversity and local character to continue; and
- * Development of viewing places in important view locations such as Galston Gorge which provide interpretation of the view and safe access.

Arcadia Road corridor (between Galston Village and Arcadia Park)

Things to discourage:

- * Cluttered developments set close to the road;
- * Proliferation of signage;
- * Urban treatments of street frontages; and
- * Loss of view lines and panoramas.

Things to encourage:

- * Varied set backs from the street for both residential and commercial developments to encourage maintenance of site lines to the surrounding landscape;
- * Landscape treatment to soften the impact of developments and integrate them into the rural landscape;
- * Buildings of rural scale and forms which relate to the local precedents; and
- * Reduction in the visual impact of signage.

Bay Road corridor (between Arcadia Park and Berowra Waters)

Things to discourage:

- * Cluttered developments set close to the road;
- * Proliferation of signage;
- * Prominent industrial and residential developments on visually sensitive ridge top locations;
- * Buildings in sensitive locations using: roof and wall colours which are light or saturated colours of a hue which contrasts to the surroundings, reflective roofs, simple prismatic shapes, extensive associated earth works, no screening vegetation; and
- * Loss of view lines and panoramas

Things to encourage:

- * Maintenance of site lines to the surrounding landscape;
- * Landscape treatment to soften the impact of developments and integrate them into the rural landscape;
- * Buildings of rural scale and forms which relate to the local precedents; and
- * Development of design guidelines to minimise the visual impacts of industrial and residential developments in sensitive ridge top locations

Views from within Marramarra National Park

Things to discourage:

- * Prominent industrial and residential developments on visually sensitive ridge top locations; and
- * Buildings in sensitive locations using: roof and wall colours which are light or saturated colours of a hue which contrasts to the surroundings, reflective roofs, simple prismatic shapes, extensive associated earth works, no screening vegetation.

Things to encourage:

- * Maintenance of site lines to the surrounding landscape;
- * Landscape treatment to soften the impact of developments and integrate them into the natural landscape; and

- * Development of design guidelines to minimise the visual impacts of industrial and residential developments in sensitive ridge top locations.

Hawkesbury River corridor

Things to discourage:

- * Buildings on ridges and highly visible slopes;
- * Buildings with simple prismatic shapes, light colour or saturated colours of a hue which contrasts to the surroundings, reflective roofs, extensive associated earth works and no screening vegetation;
- * Large scale new residences of suburban form which do not compliment the rural setting;
- * Loss of view lines and panoramas;
- * Recreational developments in sensitive locations; and
- * Use of gabion retaining walls in locations prominent from the river.

Things to encourage:

- * Continued agricultural use of the river flats;
- * Use of vegetation to provide screening and reduce the visual bulk and scale of buildings;
- * Buildings of rural scale and forms; and
- * Development of viewing places in important view locations which provide interpretation of the view and safe access.

Areas of scenic significance

Type 1: Mixed Intensive Agriculture

Landform: Broad to moderate gently sloping ridge crests and upper slopes on the plateau top and residual spurs developed on Glenorie soil landscapes.

Land cover: Intensively cleared and cultivated agricultural land on productive soils with few remnants of native vegetation. Vegetation cover is largely of crops and ornamental plants.

Cultural landscape: Closely settled with a small scale grid pattern of subdivision and road layout. Intensive cultivated use of small plots for a variety of uses such as flowers, market gardens, hot house vegetables and nurseries. Built elements include residences, farm buildings, irrigation and earth moving equipment, demountable greenhouses, dams and fences, mostly of wire. Residence vary in architectural style and age, from traditional to suburban, many with Spanish and Mediterranean influences.

Water form: Inconspicuous. Dams, tanks and storages are evidence of the cultural use of water in the landscape.

Landscape character: A fully designed and maintained cultural landscape with few intrinsic natural elements, dominated by horticulture and agricultural production on small holdings. Residences and agricultural buildings are prominent and often undisguised by gardens, with productive landscape coming right up to the structures. Houses are often located away from the road frontage and oriented in the traditional rural manner to take advantage of environmental conditions. Wind breaks and avenues of ornamental and exotic trees are occasionally seen between and within properties. Pines are often the most conspicuous species both by their height, crown form and dark colour. Landscapes have great visual variety at a small scale because of the intensive use of small plots of land for varied uses, often with bare soil, differing crops and growth stages present. Colour, line and texture contrasts between lots and between adjoining properties are common and vary with the seasons. Flowers in farms and nurseries frequently add brilliance and further variations as blocks of colour with varied textures.

Scenic quality issues: Residential and hobby farming conversion of the area has the potential to alter the rural character to one which is less identifiable with the area and more urban. It can have the effect of simplifying the visual elements, decreasing the variety of rural activities and making the landscape appear more open by removing the intensive, small scale of plots which is characteristic of the area. Cultural plantings of wind row species such as pines and other conifers are reaching the end

of their lives and native vegetation remnants on road verges are vulnerable to loss following regular mowing and grazing.

Absorption capacity: High for a wide variety of continuing intensive agricultural uses of the land and related residential use of similar form and scale. Moderate for conversion of the landscape to rural residential hobby farming.
Low for exclusively residential use.

Visual sensitivity: High. These areas have high visibility because of the gentle topography and cleared nature of the land. The small scale of blocks and extensive road pattern gives easy visual access to property frontages.

Detracting elements: Over scale new residences of suburban form which do not complement the rural setting.

Urban treatments of the streetscape such as formal gates, "security" entrances and high fences which interrupt or restrict district views.

Excessive hard surfacing.

Strict alignment of new dwellings oriented to the road frontage and with short set backs to the street.

Loss of the visual complexity of the landscape by clearing of vegetation and conversion to grassy and manicured surfaces.

Groups of bulky farm buildings and residences close to road frontages (eg. near Arcadia general store, Arcadia Road).

Things to encourage:

- * The maintenance of intensive horticultural and agricultural uses of the land;
- * Maintenance of natural road verges and the regeneration of remnants of natural vegetation which can be found there;
- * Planting, maintenance and replacement of wind row and avenue plantings with appropriate species;
- * Siting of residences to take advantage of site conditions;
- * Building sizes and styles which relate to the rural environment;
- * Traditional treatment of the street frontage of new developments which may include screening vegetation but which preserves sight lines;
- * A variety of building forms which relate to the rural setting and local precedents; and
- * Use of traditional plant species of the area in landscape schemes.

Things to discourage:

- * Excessive bulk and height of buildings;
- * Excessively urban street frontage treatments;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines;
- * Clearing of wind row vegetation and other ornamental plantings;
- * Excessive manicured areas; and
- * Rural industrial land uses

Significance: Regional significance. These landscapes are confined to the Lower Hawkesbury Valley sub-system and are the only examples in the region of the particular combination of cultural elements and Glenorie soil landscapes.

Type 2 - Mixed Agricultural and Rural Residential

Landform: Undulating side slopes below ridge crests on the plateau top and residual spurs often developed on Lucas Heights soil landscapes.

Land cover: Cleared agricultural land on productive soils with remnants of native vegetation on lower slopes, stream margins and gullies. Vegetation cover is varied with pockets of intensive crops but is largely of orchards, pastures and designed or manicured residential landscapes.

Cultural landscape: Varied settlement pattern with a variable scale of lot sizes on a grid pattern of subdivision and road layout. Intensive uses such as flowers, market gardens, hot house vegetables and nurseries are isolated and not prominent. Orchards, grazing land, hobby farms and horse yards are more common. Built elements include residences, farm buildings, demountable greenhouses, dams and fences, mostly with timber rails. Dams, tanks and storages are evidence of the cultural use of water in the landscape. Wind break and avenue plantings are prominent. Residences vary in architectural style and age, from traditional to suburban, many of large scale and with designed landscapes or manicured lawns.

Water form: Inconspicuous, but drainage lines and gullies are marked by natural vegetation.

Landscape character: A rural cultural landscape dominated by larger scale agricultural production and rural industries, hobby farms and rural residences on small holdings. Natural vegetation is an intrinsic element on road verges, creek lines and some hill tops. Agricultural buildings such as packing sheds and demountable greenhouses are prominent. Residences are often surrounded by gardens and properties by post and rail fences. Houses are often located away from the road frontage and oriented in the traditional rural manner to take advantage of environmental conditions. Wind breaks and avenues of ornamental and exotic trees are common. Landscapes have visual variety resulting from the mix of land uses rather than small scale contrasts among adjoining similar uses. Grazed and manicured grassy areas, horses and stables are common. Large residences with designed and managed formal gardens and surrounding landscapes, often set well back from the road, are found within productive agricultural land.

Scenic quality issues: Residential and hobby farming conversion of the area appears to be having the effect of replacing variety of land uses with uniformity, either of grazing land with horses or residential with manicured grassy surroundings. The rural character and diversity could be replaced with a more uniform and more urban character. Cultural plantings of wind row species such as pines and other conifers are reaching the end of their lives and native vegetation remnants on road verges are vulnerable to loss following regular mowing and grazing.

Absorption capacity: High for a variety of continuing agricultural uses of the land and related residential use of similar form and scale.

Moderate for conversion of the landscape to rural residential hobby farming.

Low for exclusively residential use.

Visual sensitivity: Moderate. These areas have medium visibility because of gentle topography, mostly cleared land, but significant levels of native vegetation. The small scale of blocks and extensive road pattern gives easy visual access to property frontages.

Detracting elements:

- * Over scale new residences of suburban form which do not compliment the rural setting;
- * Lack of native vegetation to provide screening and reduce the visual bulk and scale of buildings;
- * Urban treatments of the streetscape such as formal gates, "security" entrances and high fences which interrupt or restrict district views;
- * Loss of the visual complexity of the landscape by clearing of vegetation and conversion to grassy and manicured surfaces both of properties and road verges; and
- * Subdivision and rural residential conversion into small lots

Things to encourage:

- * The maintenance of agricultural uses of the land;
- * Maintenance of natural road verges and of natural vegetation in drainage lines and on properties;
- * Planting, maintenance and replacement of wind row and avenue plantings with appropriate species;
- * Siting of residences to take advantage of site conditions;
- * Building sizes and styles which relate to the rural environment;

- * Traditional treatment of the street frontage of new developments which may include screening vegetation but which preserves sight lines;
- * A variety of building forms which relate to the rural setting and local precedents;
- * Use of plant species which have been traditionally used in the area in landscape schemes; and
- * Establishment of young plants to eventually replace mature native trees left on grazed properties.

Things to discourage:

- * Subdivision sizes which result in residential development of an essentially urban nature;
- * Excessive bulk and height of buildings;
- * Excessively urban street frontage treatments;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines;
- * Clearing of wind row vegetation and other ornamental plantings;
- * Excessive manicured areas; and
- * Rural industrial land uses.

Significance: Local significance. These landscapes are representative of the Hornsby area and appreciated by local people.

Type 3: Orchards and Poultry Farming

Landform: Narrow ridge crests on the plateau top and on spurs often developed on Lucas Heights and Gymea soil landscapes.

Land cover: Small pockets of cleared land on marginal soils among remnants of native vegetation. Often surrounded by natural bushland on lower slopes, stream margins and gullies. Orchards and remnants of previous orchard use and poultry sheds are common.

Cultural landscape: Simple settlement pattern usually following ridge lines closely, with orchard and poultry farms often favouring north facing slopes. Built elements include residences, farm buildings, chicken sheds, dams, tanks, feed silos and fences, mostly of wire. Wind breaks are prominent in areas with orchards. Residences are usually traditional rural vernacular in style without designed landscapes or extensive manicured lawns.

Water form: Inconspicuous.

Landscape character: A landscape dominated by agricultural production of fruit and chickens. Natural vegetation is an intrinsic element on road verges, creek lines and some hill tops. Agricultural buildings such as packing sheds and chicken sheds are prominent. Houses are often located away from the road frontage, related to farm buildings and without formal gardens. Wind breaks of exotic trees are common, particularly of pines. Landscapes have less visual variety than other mixed agricultural areas.

Scenic quality issues: The apparent decline of both rural industries in the area has the potential to change the rural character. Similar areas are already converted either to grazing land with horses or residential with manicured grassy surroundings. The rural character could be replaced with a more uniform and more urban character. Wind rows and other cultural plantings are vulnerable to loss in this process.

Absorption capacity: High for a variety of continuing agricultural uses of the land and related residential use of similar form and scale.

Moderate for conversion of the landscape to rural residential hobby farming.

Visual sensitivity: Moderate to low. These areas have medium to low visibility because of significant levels of surrounding native vegetation and the screening effect of orchard trees.

Detracting elements: Over scale new residences of suburban form which do not compliment the rural setting.

Loss of the visual complexity of the landscape by clearing of vegetation and conversion to grassy and manicured surfaces both of properties and road verges.

Subdivision and rural residential conversion into small lots

Things to encourage:

- * The maintenance of agricultural uses of the land;
- * Maintenance of natural road verges and of natural vegetation in drainage lines and on properties;
- * Planting, maintenance and replacement of wind row and avenue plantings with appropriate species;
- * A variety of building forms which relate to the rural setting and local precedents;

Things to discourage:

- * Subdivision sizes which result in residential development of an essentially urban nature;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines;
- * Clearing of wind row vegetation and other ornamental plantings; and
- * Excessive manicured areas.

Significance: Local significance: These landscapes contribute to the rural quality of the area and are becoming rare.

Type 4: Intensive Orchard Landscapes

Landform: Narrow ridge crests and saddles on the plateau top and on residual spurs, often developed on sandy loam Lucas Heights soil landscapes.

Land cover: Orchards of citrus and stone fruits are prominent. These use modern techniques of establishment and culture with close spaced trees of columnar form. Some associated grazing land grades into native vegetation on lower slopes.

Cultural landscape: Linear settlement pattern following the ridge lines. Intensive orcharding use of the land. Built elements include residences, farm buildings, dams and fences. Wind break and avenue plantings are not prominent.

Water form: Inconspicuous.

Landscape character: A rural cultural landscape dominated by orchards and rural residences on small holdings in a natural setting. Natural vegetation is the major intrinsic element of the larger view. Landscapes have visual interest from the geometry, line, texture and colour contrasts which occur between the orchards and the natural surroundings, but little variety.

Scenic quality issues: These areas are in the process of active change in their character, while remaining within the rural genre. Intensive re-use of these areas for orchards ensures a stable visual character for them at present.

Absorption capacity: High for a variety of continuing agricultural uses of the land and related residential use of similar form and scale.

Low for conversion of the landscape to rural residential hobby farming.

Very low for exclusively residential use.

Visual sensitivity: Moderate. These areas have medium to high visibility because of their topographic situation, but are isolated in areas without large numbers of potential viewers.

Detracting elements: Few.

- * Earth works and quarries such as Len's Dam Place; and
- * Some residences are in prominent positions frequently without surrounding designed landscapes and could benefit from screening from the roads.

Things to encourage:

- * The continued redevelopment of agricultural uses of the land;
- * Maintenance of natural road verges and of natural vegetation;
- * Building sizes and styles which relate to the rural environment;
- * A variety of building forms which relate to the rural setting and local precedents; and
- * Establishment of young plants to eventually replace mature native trees left on grazed parts of properties.

Things to discourage:

- * Subdivision sizes which result in residential development of an essentially urban nature;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines; and
- * Rural industrial land uses.

Significance: Local significance. These landscapes are outstanding local examples of a type which is not common in the Hornsby Area.

Type 5: Active conversion of Orchard and Poultry Farms to Hobby Farms

Landform: Undulating side slopes below ridge crests on the plateau top and residual spurs often developed on Lucas Heights and Gymea soil landscapes.

Land cover: Cleared agricultural land on previously productive soils which are in the process of conversion to grassy, open landscapes.

Cultural landscape: Varied settlement pattern with a variable scale of lot sizes. Grazing land, hobby farms, horse yards and remnants of orchards and poultry farming are common. Built elements include residences, farm buildings, stables and yards, dams and fences, and remnants of poultry sheds. New fences are mostly with timber rails. Wind break and avenue plantings are prominent features of the previous land use. Residences vary in architectural style and age, from traditional to suburban, many of large scale and with designed landscapes or manicured lawns.

Water form: Inconspicuous, but drainage lines and gullies are marked by natural vegetation.

Landscape character: A rural cultural landscape dominated by hobby farms and rural residences on small holdings. Natural vegetation is an intrinsic element on road verges, creek lines and some hill tops. New residences are often surrounded by gardens and properties by post and rail fences. Wind breaks and avenues previously associated with orchards are common. Landscapes have less visual variety as they are converted from agricultural use. Grazed and manicured grassy areas, horses and stables are common among remnants of the previous land use.

Scenic quality issues: Residential and hobby farming conversion of the area has the effect of replacing variety with uniformity, and diversity of land cover with the openness and simplicity of grazed paddocks or residences with manicured grassy surroundings. Cultural plantings and native vegetation remnants are vulnerable to loss following clearing, filling, recontouring, regular mowing and grazing.

Absorption capacity: Moderate for conversion of the landscape to rural residential hobby farming with a variety of land covers.

Low for exclusively residential use.

Visual sensitivity: High. These areas have high visibility because of mostly cleared land. The small scale of blocks and extensive road pattern gives easy visual access to property frontages.

Detracting elements: Over scale new residences of suburban form which do not compliment the rural setting.

Urban treatments of the streetscape such as formal gates, "security" entrances and high fences which interrupt or restrict district views

Loss of the visual complexity of the landscape by clearing of vegetation and conversion to grassy and manicured surfaces both of properties and road verges.

Subdivision and rural residential conversion into small lots

Things to encourage:

- * The maintenance of varied and productive agricultural uses of the land;
- * Maintenance of natural road verges and of natural vegetation in drainage lines and on properties;
- * Planting, maintenance and replacement of wind row and avenue plantings with appropriate species;
- * Siting of residences to take advantage of site conditions;
- * Building sizes and styles which relate to the rural environment;
- * Traditional treatment of the street frontage of new developments which may include screening vegetation but which preserves sight lines;
- * A variety of building forms which relate to the rural setting and local precedents;
- * Use of plant species which have been traditionally used in the area in landscape schemes; and
- * Establishment of young plants to eventually replace mature native trees left on grazed properties.

Things to discourage:

- * Subdivision sizes which result in residential development of an essentially urban nature;
- * Excessive bulk and height of buildings;
- * Excessively urban street frontage treatments;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines;
- * Clearing of wind row vegetation and other ornamental plantings;
- * Excessive manicured areas; and
- * Rural industrial land uses.

Significance: Local significance. These areas are characteristic of the Hornsby area, have low visual absorption capacity and high sensitivity.

Type 6: Rural Residential on Marginal Land

Landform: Side slopes and tips of narrow ridges below the plateau top where the underlying Hawkesbury sandstone occurs at the surface. Soil landscapes are generally of the Gymea and Hawkesbury type.

Land cover: Natural woodland and forest vegetation, sometimes selectively cleared for rough grazing. Gully vegetation may include shale-influenced species. Often surrounded by natural landscapes of reserves or national parks.

Cultural landscape: Simple linear settlement pattern following ridge crests and dead-end roads. Residences and their natural or designed landscapes are the most prominent elements. Built elements include residences, sheds and garages, pools and paving. Residences vary in architectural style and age, but are mostly urban in form, many of very large scale and with designed landscapes or manicured lawns.

Water form: Inconspicuous, but drainage lines and gullies are marked by natural vegetation.

Landscape character: A secluded residential landscape in a bush setting with a generally harmonious relationship between residences and the natural landscape. Natural vegetation is an intrinsic element among which residences and designed landscapes are found. Residences are often surrounded by gardens and located away from the road frontage. Ornamental and exotic plantings are common but tend to be subordinate to the native bush setting. Landscapes have visual variety resulting from the mix of residential and garden styles.

Scenic quality issues: These areas often have little visual impact on the surrounding rural landscapes because they are hidden by topography and vegetation. Their expansion into areas of the plateau which have more rural character would be undesirable.

Absorption capacity: High for residential uses of similar form and scale.
Moderate for exclusively residential use, provided the density is kept low.

Visual sensitivity: Low. These areas have low visibility because of their location below the plateau top, steeper topography, natural vegetation cover and location which is often near the end of "dead end" roads.

Detracting elements: Over scale new residences of suburban form which do not compliment the rural setting.

Urban treatments of the streetscape such as formal gates, "security" entrances and high fences.
Loss of the visual complexity of the landscape by clearing of vegetation and conversion to grassy and manicured surfaces both of properties and road verges.

Things to encourage:

- * Siting of residences to reduce visibility from roads;
- * Treatment of the street frontage of new developments which may include screening vegetation but which preserves sight lines; and
- * A variety of building forms.

Things to discourage:

- * Subdivision sizes and designs which result in residential development of an essentially urban nature;
- * Excessively urban street frontage treatments;
- * Buildings set too close to the road;
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines; and
- * Excessive manicured areas and mown verges.

Significance: Local significance. These areas add to the variety of visual elements in the area.

Type 7: Alluvial Agricultural Lands

Landform: Virtually flat alluvial deposits on the inside of major bends in the river.

Land cover: Cleared agricultural land on productive soils, with remnant orchards and stands of native vegetation, particularly she oak and mangrove forests, near the water's edge. Land is used mostly for grazing.

Cultural landscape: Very low settlement density with no formal road pattern. Development consists of residences and rural properties with one recreational facility, a ski park. Land is in grazing use. Built elements include residences and farm buildings, mostly without formal gardens or landscapes. Residences vary in architectural style and age, from traditional to suburban.

Water form: River action has created the landscape at all scales, both the spectacular river valley and the alluvial flats.

Landscape character: A rural cultural landscape dominated by the spectacular natural environment into which the cultural elements fit harmoniously but are subordinate. Residences and farm building vary in prominence depending on being viewed from road or water. Houses are often located away from the road frontage and oriented in the traditional rural manner to take advantage of views and breezes. Landscapes of the flats have little visual variety of topography, vegetation or land use.

Scenic quality issues: Residences and recreational facilities are highly visible from the waterway and in some cases Singleton's Road. The rural character of the area could easily be changed by relatively modest development such as low density residential subdivision or recreational resorts.

Absorption capacity: Moderate for a variety of continuing agricultural uses of the land and related residential use of similar form and scale.

Low for conversion of the landscape to rural residential hobby farming.
Very low for exclusively residential or intensive recreational uses.

Visual sensitivity: High. These areas have high visibility because of gentle topography, mostly cleared land, and long view lines from the river and roads.

Detracting elements: Over scale new residences of suburban form which do not complement the rural setting.

Urban treatments of the streetscape such as formal gates, "security" entrances and high fences which interrupt or restrict district views.

Things to encourage:

- * The maintenance of agricultural uses of the land;
- * Maintenance of natural road verges and of natural vegetation in drainage lines and on properties;
- * Siting of residences to retain view lines from the river;
- * Building sizes and styles which relate to the rural environment;
- * A variety of building forms which relate to the rural setting and local precedents; and
- * Establishment of young plants to eventually replace mature native trees left on grazed properties.

Things to discourage:

- * Subdivision sizes which result in residential development of an essentially urban nature;
- * Excessive bulk and height of buildings;
- * Excessively urban street frontage treatments;
- * Buildings set too close to the road; and
- * Prominent buildings located in highly visible locations or which interrupt sensitive sight lines.

Significance: State significance. These landscapes are part of a landscape of acknowledged high scenic value and are also rare in the local area.

Type 8: Alluvial Wetlands

Landform: Essentially flat alluvial tidal wetlands with lagoons and tidal creeks developed on Lane Cove and Mangrove Creek soil landscapes.

Land cover: Natural vegetation of salt marshes and meadows, with fringing forests of she oak and mangrove at the water's edge.

Cultural landscape: Nil.

Water form: Water action is responsible for the production and character of the landscape. Tidal water level changes and the interaction of these with deposition of silt and alluvium by the river, combined with inflows of fresh water from the surrounding area, maintain the natural wetland structure.

Landscape character: A natural river landscape dominated by mixed wetland vegetation.

Scenic quality issues: Maintenance of natural processes and prevention of exploitation of these landscapes is all that is required to retain their character.

Absorption capacity Low.

Visual sensitivity Moderate. These areas have medium visibility from roads and the river because of the open nature of the salt marsh and meadow components. She oak and mangrove forest fringes to the water are variable in density allowing views to penetrate in places.

Detracting elements: Nil

Things to encourage:

- * The maintenance of natural processes and water quality; and
- * Appreciation of the natural qualities of these unusual environments.

Things to discourage:

- * Damaging recreational use of the area; and
- * Any other use.

Significance: State significance. These landscapes are part of a landscape of acknowledged high scenic value and are also rare in the Hornsby area and threatened by decreasing water quality standards.

Type 9: Creek Flood Plains

Landform: Flat to gently undulating alluvial deposits at the mouths of minor streams entering the river, developed on Lane Cove and Mangrove Creek soil landscapes.

Land cover: Naturally treeless wetland vegetation and also cleared land on waterlogged to occasionally inundated soils.

Cultural landscape: Nil. These areas are used for occasional rough grazing and otherwise have few significant cultural elements. Ashdale Creek was the source of water for the historic Singleton's Mill.

Water form: Inconspicuous streams meander through these wetlands or spread into various channels. The most extensive of these streams is Ashdale Creek.

Landscape character: Small and secluded wetland landscapes which are away from the river and roads as visual access, surrounded by precipitous sandstone hills and cliffs with natural vegetation.

Scenic quality issues: The wetlands are vulnerable to degradation caused by clearing and grazing.

Absorption capacity Low. Any developments would be highly visible.

Visual sensitivity Moderate. These areas do not have easy visual access but within them views can be extensive, depending on the vegetation type.

Detracting elements: Few.

Things to encourage: The maintenance of natural processes and water quality.
Reduction in grazing use.

Things to discourage: Destructive recreational use
Grazing and other agricultural use

Significance: State significance. These landscapes are rare in the Hornsby area and threatened by decreasing water quality standards.

APPENDIX K
SUBDIVISION OPTIONS

Name / description	Advantages	Disadvantages
Option 1 - Minimum Allotment Size Reflects the current planning framework where the minimum allotment size for localities are specified.	Provides certainty about future development; Creates a regular subdivision pattern; Simple to administer.	Lack of flexibility, ie. properties may not meet the prescribed subdivision standard; Tendency not to consider land capability or environmental characteristics; Can create servicing inefficiencies, because everything is at a prescribed distance.
Option 2 - Average Lot Area Allow subdivision based on average lot areas with a minimum average requirement, for example subdivision of a 10 hectare lot into lots ranging from 1 to 4 hectares with a minimum average of 2 hectares.	Allows more flexibility, to overcome environmental constraints or competing land uses; More productive land could remain in larger parcels, while land unsuitable for agriculture could be used for residential purposes;	Creates a range of lot sizes; Less certainty about subdivision potential; Does not completely overcome competing land use interests (future pressure to allow the large lots to be subdivided); Difficult to administer.
Option 3 - Performance Control Subdivision being permitted where certain criteria are met, eg. agricultural production, pollution control, water supply, reduced bush fire risk	Allows flexibility; Accounts for environmental characteristics	Less certainty about subdivision potential; Difficult to administer equitably; Costly to administer and defend in court; What criteria to use and weighting of criteria.
Option 4 - Concessional Lots Allow persons to subdivide a "house" lot from the remainder of the property, and allowing a dwelling to be built on the new lot	Suitable for persons no longer able to farm property, but can still live in family household.	Creates small lots amongst larger properties; Creates infrastructure inefficiencies; No planning rational, as subdivision based on the location of existing dwellings, and occupant characteristics; Difficult to administer.

Option 5 - Concession Lots Without Dwelling Rights Allow persons to subdivide a "house" lot from the remainder of the property, but does not allow a new dwelling to be built on the new lot.	Suitable for persons no longer able to farm property, but can still live in family household; Remainder of land can be used for agriculture.	No dwelling approval; Difficult to administer. No planning rationale, as subdivision based on existing dwelling and occupancy characteristics.
Option 6 - Community Title with Farm-house Allotments Viable agricultural and environmentally significant land is held in community title, with farm-house lots held in Torrens title. The number of farm-house allotments being calculated on the basis of prescribed density, with perhaps some additional compensation for the communal ownership. Subdivision would also only be granted where a series of environmental and infrastructure criteria are met.	Provides for the creation of smaller lots for dwellings; Retains agricultural and environmentally sensitive land. Suitable for persons no longer able to farm property, but can still live in family household.	Difficult to administer. Less certainty about future subdivision potential.
Option 7 - Cluster Housing Dwellings congregate in groups with the agricultural and environmentally sensitive lands surrounding the dwellings.	Concentration of dwellings provides for more efficient servicing; Retains large tracts of rural lands.	Less certainty about future subdivision potential of super lots. Future pressure for further subdivision. Difficult to administer

APPENDIX L
PROPOSED LAND USE TABLE - RURAL VES

Land use	Permitted uses				
	Rural AA	Rural AR	Rural AE	Rural BA	Rural BR
agriculture	Without consent				
agricultural structures (less than 200m ²)	Without consent				
agricultural structures (greater than 200m ²)	With consent				
animal establishments	With consent				
aquaculture	With consent				
attached dwellings	With consent				
bed and breakfast accommodation	With consent	With consent	Prohibited	With consent	With consent
child care centres	With consent	With consent	Prohibited	With consent	With consent
communication facility	With consent				
community facility	With consent	With consent	Prohibited	With consent	With consent
dams	With consent				
dwelling houses	Without consent				
ecotourism facility	With consent	With consent	Prohibited	With consent	With consent
extractive industries	With consent				
farmstay accommodation	With consent	With consent	Prohibited	With consent	With consent
forestry	With consent				
group homes	With consent				
guesthouse accommodation	With consent	With consent	Prohibited	With consent	With consent
home industries	With consent				
home occupations	Without consent				
intensive agriculture	With consent				
land clearing	With consent				
mines	With consent				
places of worship	With consent	With consent	Prohibited	With consent	With consent
public buildings	With consent	With consent	Prohibited	With consent	With consent
recreation areas	With consent				
recreation facility	With consent				
residential offices	With consent				
roadside stalls	With consent				
rural industries	With consent				
rural structures (less than 50m ²)	Without consent				
rural structures (greater than 50m ²)	With consent				
rural workers' dwellings	With consent				
special care homes	Without consent				
stock & sale yards	With consent				
subdivision	With consent				
utility installations	With consent				
veterinary hospitals	With consent	With consent	Prohibited	With consent	With consent